Automated Batting Cages

PT-7
PASTIME
OPERATION AND TECHNICAL MANUAL

Automated Batting Cages
8811 Huff Avenue N.E.
Salem, OR 97303

(800)578-2243
battingcages.com

FOREWORD

IMPORTANT!

This Operation and Technical Manual ***provides the owners and maintenance personnel with information covering Safety Procedures, Maintenance Procedures, Operational Procedures and Repair and Servicing of the Batting Cage equipment provided by Automated Batting Cages Corp. Read this document carefully. This equipment system contains several moving parts and has high voltage present which pose potential hazards to maintenance and operational staff. Pitching baseball/softballs to batting range customers also poses inherent risks to the batters. It is essential for operating a safe batting range operation that the owner/operator have a complete understanding of this manual. This manual must be used in conjunction with ABC training video tape to train employees in the safe operation and servicing of the ABC batting range equipment system and to minimize potential risks to the batting range customers.***

ABC will update this manual from time to time. These updates and notices will be mailed to the address that ABC has on record as your shipping address. Add these updates and notices to your manual. Should any of these pages be lost or damaged, call ABC and the pages will be replaced.

Please observe the following:

1). Keep this manual in the Maintenance Shop or Office during all working hours.

2). Maintenance Personnel must review this manual before servicing any equipment. Personal injury could result if maintenance personnel have not reviewed this manual.

3). All employees must review the "Standards for Batting Range Safety and Operation" of this manual and the ABC training video tape.

4). When new procedures, standards, additions or other changes are made to this manual, add them immediately to the manual.

Rev. ABC111

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Limited Warranty

Warranty applies to original purchaser of the equipment and all products or accessories purchased from Automated Batting Cages, Corp. (ABC) unless specifically excluded. This warranty is not transferable and proof of original purchase may be required. Warranty begins on date of equipment installation. Products must be used in accordance with manufacturer's specifications, servicing specifications and operational standards.

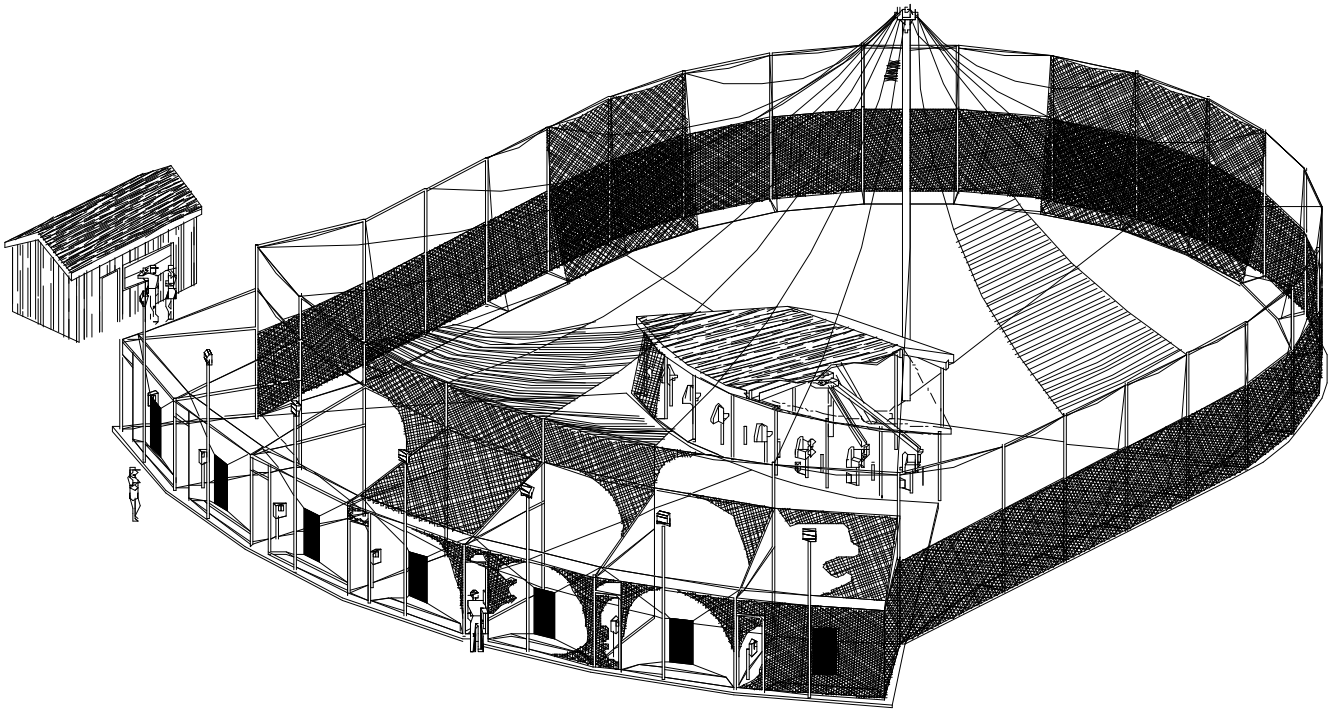
"ABC" warrants original equipment purchased with new systems for a period of one year from the original date of installation. "ABC" will repair or replace, at their option, any product, accessory or part that is proven to be defective in materials or workmanship under normal use during the warranty period. Anything that is replaced under warranty becomes the property of "ABC". All parts replaced under warranty are considered part of the original product and warranty shall expire concurrently with the warranty of the original purchase. **ABC offers a 90 day warranty period on all equipment, parts and accessories purchased after the initial one year warranty on new systems has expired.**

To obtain warranty, purchaser must return **at their expense** the defective part or product to "ABC". Items under warranty will be repaired or replaced by "ABC" without any charge for parts. Warranted items will be shipped or returned free of shipping charges to customer via **UPS GROUND**. Expedited shipping methods are available at purchaser's expense. Labor to replace defective parts, products and systems are excluded from this warranty and are the responsibility of the purchaser.

This warranty does not extend to products, accessories, or parts that are affected by misuse, poor maintenance, acts of nature, normal wear, neglect, improper installation, uses in applications not designed or intended, unauthorized alterations, or any other cause other than defects in materials and workmanship of the product. **Warranty does not include aluminum baseball or softball bats resold by "ABC" to purchaser.**

In no event will "ABC" be responsible for consequential damages and limitation of implied warranties. "ABC" disclaims any responsibility for loss of time or use of the products, commercial loss, transportation, or any other incidental damage. Any implied warranties are limited to the duration of this warranty.

ABC STANDARDS FOR BATTING RANGE SAFETY & OPERATION



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DESIGN STANDARDS

THESE BATTING RANGE DESIGN STANDARDS APPLY TO ALL OPERATORS/OWNERS OF ABC COMMERCIAL BATTING RANGES. THESE DESIGN STANDARDS PROMOTE AND ADVANCE SAFE BATTING RANGE OPERATIONS. THESE STANDARDS SHOULD BE UNDERSTOOD AND FOLLOWED BY ALL OPERATORS/OWNERS OF COMMERCIAL BATTING RANGES. ABC IS NOT RESPONSIBLE FOR THE COMPLIANCE OF THESE DESIGN STANDARDS OR THE CONSEQUENCES OF NON-COMPLIANCE.

1. All batting areas (batting stalls) must be well defined and have marked areas where the batter must stand.

2. All batting areas (batting stalls) must have a well defined and marked area where the balls will be generally thrown. Batters boxes and home plates must be painted in batting area. Batting stalls must be a hard surface, recommended materials include concrete, asphalt or wood.

3. All batting areas (batting stalls) must have a well defined and marked areas where batters are excluded.

5. Sloping floors, to allow for balls to roll out of batting area, should be used in all batting range operations.

6. Batting stalls must have adequate width to protect all batters and allow for batters swing width.

7. Batting stalls must have adequate depth to provide protection for batters and adjacent batters.

8. All batting stalls must have adequate lighting to provide complete visibility of pitched balls from pitching machine to home plate.

9. All pitching systems must employ Warning Light(s) or other visible methods to signal the batters that the pitching mechanism is ON and is capable of pitching a ball at any time.

10. Spectators must be adequately protected from contact with balls by netting and fencing systems. Balls should never be able to escape the batting cage area.

11. Equipment system must provide for stop and starting operation while operating continually ("rental play").

12. All batting stall gates must employ self-closing mechanisms to prevent balls from exiting the batting stalls.

13. All batting stalls which operate "dual-pitching mechanisms" (both baseball and softball pitching mechanisms) must be adequately marked to inform batters of dual-use mechanisms.

14) All batting stalls must have protective padding on front of the vertical pipes to cushion the balls from ricocheting back towards the batters.

OPERATIONAL SAFETY STANDARDS

THESE OPERATIONAL SAFETY STANDARDS APPLY TO ALL OPERATORS/OWNERS OF AN ABC COMMERCIAL BASEBALL AND SOFTBALL BATTING RANGE. THEY ARE INTENDED TO INFORM THE OPERATORS/OWNERS OF THE DANGERS AND RISKS ASSOCIATED IN THE OPERATION OF THE BATTING RANGE AND TO PROMOTE THE SAFE OPERATION OF THE BATTING CAGES. ALL STANDARDS SHOULD BE UNDERSTOOD AND FOLLOWED TO FACILITATE SAFETY IN THE BATTING CAGES. ABC IS NOT RESPONSIBLE FOR THE COMPLIANCE OF THESE SAFETY STANDARDS OR THE CONSEQUENCES OF NON-COMPLIANCE.

1 All batting stalls must adequately display a sign indicating how to operate the batting cage system. This sign must include the following information: How to start the game, When balls will be pitched, And when the game is over.

2 All batting range operations must adequately display a sign indicating that pitching machines will throw both balls and strikes.

3 All batting range operations must adequately display "Warning/Rules" sign's which include the following warnings and rules:

*Batters MUST wear helmets with face mask protection at all times.

*If machines are pitching out of the strike zone immediately alert the attendant.

*Only one person in the batting cages at a time during play. No coaches allowed in cage during game play.

*No switch hitting during game.

*Batters must wear shoes. (No Baseball-Softball Cleats)

*No person under the influence of Drugs or Alcohol is permitted to use the batting cages.

*Report all accidents immediately.

*These pitching machines throw both balls and strikes. Players should "Be Alert" at all times.

*Do not stand on home plate.

*Watch for balls rolling under feet.

*No one under the age of 6 years old is permitted to use the batting cages.

*No one under the age of 16 is allowed to use cages throwing the effective speed of 70 - 75 Mph.

*An adult must accompany all batting cage players under the age of 10.

*Close gates at all times when entering or exiting the cages.

*No practice swings outside of cages unless in designated areas.

*During or after the game, do not pick up balls from ground. Do not throw balls back at pitching machines.

*CAUTION! Injuries could result from the use of this device. Users should assume the inherent risks of batting baseballs and softballs. If users have any questions about the use of this device or the inherent risks associated with the use of this device, ask the attendant before using the batting cages.

OPERATIONAL SAFETY STANDARDS

4. In addition to posting "Warning/Rules" signs, Operators/Owners of commercial batting ranges must comply with the following operational safety standards:

*At least one trained attendant must be present at all times at the batting range to supervise the safe operation of the batting range. Attendant must have reviewed and understood this manual and ABC training video tape.

*At least one trained attendant must be present at all times to supervise and/or conduct the maintenance program of the batting range equipment/netting system. Attendant must have reviewed and understood this manual before performing any maintenance or servicing.

*At least one attendant must be present at all times trained in the "Safety Rules" of the batting range. Attendant must have reviewed and understood this manual and ABC training tape.

*Operator/Owner of the batting range must keep batting range equipment system maintained at all times to ABC's specifications. This manual details ABC's specifications. It must be reviewed and understood in order to maintain the ABC batting range equipment system. Keep this manual at the batting operation at all times for review. Refer to sections titled "MAINTNENACE" and "SERVICING" for specifications.

*ABC maintenance and operational forms must be completed by owner/attendant and stored for later review to confirm that maintenance and operational procedures have been followed. Refer to section titled "FORMS".

*Attendant must check ball pitching accuracy of all pitching machines at least once per day. If the accuracy has degraded, refer to the "TROUBLE SHOOTING GUIDE" section for proper adjustments.

*Operator/Owner must check daily, the condition of the balls. All balls showing signs of excessive wear, deformation, cracks, breakage or when the dimples on the balls are less than 50% of there original depth. If any of these conditions exist, remove balls from the batting range system immediately. Replace system with new balls. **New balls cannot be mixed with old balls!**

*Operator/Owner must train all attendants in the safe operation of the batting range and insist that all attendants maintain and promote a safe operation at all times. Training must include reviewing of this manual and ABC training video tape.

*Attendants or anyone inside of batting range must wear protective helmet with face guard at all times.

*Servicing of equipment system must be completed by a trained and qualified person having reviewed and understood this manual and ABC training video tape.

5. Follow all other manufacturers' operation and warnings when operating **Center Pole Winch**. All operators of **Center Pole Winch** must review and understand all operating and safety instructions.

6. Owner/Operator should establish and implement a Safety Program similar to the program detailed in the following "SAFETY PROGRAM FOR THE BATTING CAGES"

7. Balls remaining in hitting stalls must be **"Cleared"** by attendant before customer enters cage.

(*ALSO REFER TO SECTION TITLED "MAINTENANCE" FOR REGULARLY SCHEDULED MAINTENACE and OPERATIONAL PROCEDURES).

SAFETY PROGRAM FOR THE BATTING CAGES

THE FOREGOING IS A SAMPLE "SAFETY PROGRAM" FOR A COMMERCIAL BATTING RANGE. PLEASE KEEP IN MIND THAT A SAFETY PROGRAM MAY INCLUDE OTHER ELEMENTS THAN THOSE DETAILED HERE. ALL BATTING RANGE OPERATIONS SHOULD HAVE A MANAGEMENT-SPONSORED COMPREHENSIVE "SAFETY PROGRAM".

MANAGEMENT

It is essential that the management of the batting cage support the development and implementation of an effective safety program. It is the responsibility of the management to commit to a safety program and to communicate this commitment to all of management's employees. The Safety Program must include employee safety as well as guest safety and methods to carry out the program.

EMPLOYEE SAFETY

The safety of the employee must be the first priority of any safety program. Employee safety is mandated by agencies including federal, state and local municipalities. Be certain that the employees understand the risks that they are exposed to and how they can avoid these risks. Just as management must commit to the safety program, employees must also be willing to accept their responsibility to the program.

EMPLOYEE SAFETY EXPOSURE

1. Hit by pitched ball
2. Hit by batted ball
3. Hit with bat outside of batting cage
4. Injury from contact with mechanical parts (i.e. wheels, belts, motors, electrical components, etc...)
5. Hit by ball in the "pit area"
6. Injuries while batting or giving instruction
7. Slip on floor
8. Fire or robbery
9. Horse play
10. Operating Center Pole Winch (raising and lowering netting)

EMPLOYEE RISK REDUCTION

1. Thoroughly train staff regarding all Safety/Warning policies (Warning Signs, etc)
2. Wear Batting Helmets with Face Guards at all times while in hitting area, including "pit area"
3. Sound a warning to batters (whistle, yell, etc...) when going to "pit area"
4. Use safety netting in pit to block holes in netting while working in area
5. Thoroughly train all staff on operation of all pitching machines and batting range equipment systems. Have all staff review maintenance procedures with ABC Owner/Operator Manual

a. Train at initial hire

b. Re-train annually using ABC Operational and Technical Manual and ABC training video tape.

6. Thoroughly train staff of all Operating Standards relating to safety and operations
7. Turn off and unplug all electrical components when servicing equipment
8. Give instructions from outside of cages-Do Not enter cage when player is batting
9. Stop machines from pitching immediately when accidents occur or when rule enforcement is necessary
10. Do not use batting cage after accident has occurred until all equipment has been checked for proper operation

11. Train staff for all emergency policies
    a. Police telephone number
    b. Fire telephone number
    c. Ambulance telephone number
12. All staff must have a "NO TOLERANCE RULE" for breaking any Safety Rules or Procedures

GUEST SAFETY

Guest safety is essential to the batting range success. All guest safety programs must begin with the Employee safety program. Employees must be committed to this vital aspect of the business. The employees will be the most responsible for any Guest Safety Program implemented by Management.

GUEST SAFETY EXPOSURE

1. Hit by pitched ball
2. Hit by batted ball
3. Hit by bat outside of cages
4. Player too young or inexperienced to use a batting cage
5. Batters not standing in Batters Box
6. Non-Contact injuries while batting (i.e. ankle, knee, etc...)
7. Players/Guest not complying with all posted Rules
8. Food poisoning
9. Fire
10. Slip and fall
11. Horseplay

GUEST RISK REDUCTION

1. List and display <u>all</u> SAFETY/WARNING SIGNS and RULES for quest to follow (see "Operation Safety Standards")
2. Have all employees understand these SAFETY/WARNING SIGNS and RULES and ENFORCE THESE RULES! (see "Operational Safety Standards")
3. At least ONE batting range EMPLOYEE MUST BE ON DUTY AT ALL TIMES DURING CAGE OPERATION!
4. Pitching Machines, Warning Lights and related Feeding Systems must be adjusted and maintained at all times and must be in good working order at all times while batting cage is available for play.
5. Signs must be posted stating type of cage (baseball or softball) and speeds of pitch in each cage
6. Regular cleaning of floor/concrete to prevent slipping and to keep balls clean
7. All netting and protective fencing must be repaired, maintained and replaced when necessary
8. Inspect, clean and replace worn balls regularly
9. Follow all local health and safety codes
10. Employee must stop balls from pitching immediately when any accident occurs. Attend to guest immediately (refer to Management's Emergency Procedures). Do not allow batting in the batting cage where accident occurred until all equipment has been checked for proper operating condition. File Incident Report.

11. Completely train and re-train all employees about safety risks of your guests and themselves!
12. INSIST THAT EMPLOYEES HAVE ALL GUESTS FOLLOW THE POSTED RULES! EMPLOYEES MUST HAVE A **"ZERO TOLERANCE RULE"** FOR GUEST BREAKING POSTED RULES!
13. **EMPLOYEES MUST TAKE IMMEDIATE STEPS (stop pitching machines and remove batter from cage) TO MINIMIZE SAFETY RISKS TO GUEST WHEN RISK ARE APPARENT!**

FIRE PROTECTION

Fire protection should always be a part of Management's Safety Program. Consult with local fire authorities about their requirements. Be certain that employees have knowledge about the fire protection available at the batting cage.

FIRST AID

Management should have four basic areas of responsibility for First Aid.

1. Employee First Aid - Check with local agencies about First Aid Kits and your responsibility for Employee First Aid
2. First Aid to guests.
   a. Emergency First Aid - Have Emergency plan documented for employees to follow
   b. Courtesy First Aid - Have Band-Aids, ice, etc...)
3. Record Keeping and Reporting - It is essential that all First Aid (either employee or guest related) be documented and maintained for future reference
4. Injury Claims defense - Providing first aid and documenting the type and extent of all injuries and how the injury occurred is necessary for any Injury Claim Defense

INSPECTION

A Safety Program should address the need for inspections. These inspections should be focused in at least four areas:

1. Inspection of employees work area
2. Inspections to insure guest safety–see Regularly scheduled Maintenance and Operational Procedures in "Maintenance" section.
3. Inspections for housekeeping and fire protection
4. Required inspections for Federal, State and Local Requirements.

ACCIDENT INVESTIGATION

In order to reduce accidents from occurring, a preventive program must be in place. Recognizing potential risks and taking the appropriate steps to minimize or eliminate these risks is critical. All accidents must be investigated and documented, even if injuries have not resulted from the accident. Communicating these accidents should be a regular occurrence within the Safety Program.

SAFETY TRAINING

Safety training should not be confused with Job Training. Safety training should be conducted singularly

(continued next page)

and considered a separate responsibility of the employee. Safety Training should be conducted when the employee is first hired and should be reviewed at least once a year.

RECORD KEEPING

Record Keeping for the Safety Program should include several records including; Employee Injury Reports, Guest Injury Reports, Inspection/Maintenance Reports, documented Safety Program Training and reviews and "Accident Investigation" meetings. (Refer to section "Daily Operational Forms & Checklists").

BATTING RANGE EQUIPMENT MAINTENANCE

Equipment maintenance should only be performed by qualified persons with a full understanding of the equipment and how it operates. It is also very important that the person maintaining the equipment understands about the batting range operation and risks involved with repairing and maintaining the system. All daily, weekly, monthly and other periodic maintenance should be conducted on the pitching machine equipment and the related equipment. Refer to the section titles "MAINTENANCE" in the "ABC Owner/ Operators Manual" for specific maintenance and operational procedures. Document all maintenance and operational procedures and file for future reference.

COMMUNICATIONS

The Safety Program must be communicated clearly and understood by every person involved in it's implementation. Communication techniques should include written material along with on-site instructions and directions. All training sessions should be documented and filed for future reference.

HOUSEKEEPING

Safety Program should include a Housekeeping element and all staff should understand the necessity of cleanliness.

EMERGENCY PROCEDURES

Management must detail Emergency Procedures which would be followed in the event of any emergency. These emergencies will include NATURAL DISASTERS (wind, rain, earthquake, etc...), ACCIDENTS (injuries) and MAN-MADE DISASTERS (bomb threats, structural, power outages, etc...).

September 8, 1992

Dear Range Owner,

We wanted to write and share some safety features that we have added to our Batting Ranges. Please read this material and incorporate the changes.

The illustration below (figure 1.0) is an overview of a typical batting stall and batters box. Please note the 7'-6" dimension from the opening of the stall to the center of Home plate. This dimension will ensure the "Batters Box" is adequately back far enough from the opening of the stall and reduce the risk of "fouled balls" striking another batter. If your Batters Box is not at least 7'-6" as shown, you will need to move your boxes back.

Also note that we suggest you paint a red "**DO NOT PASS RED LINE**" line as shown on this drawing. The purpose of this line is to keep customers from going forward of this line. We clearly do not want customers out in "open" area, in the "pit", or batting in an area which will cause the flight of the ball to enter another stall.

Please implement these changes or additions for the stalls immediately. If you have any questions please call ABC.

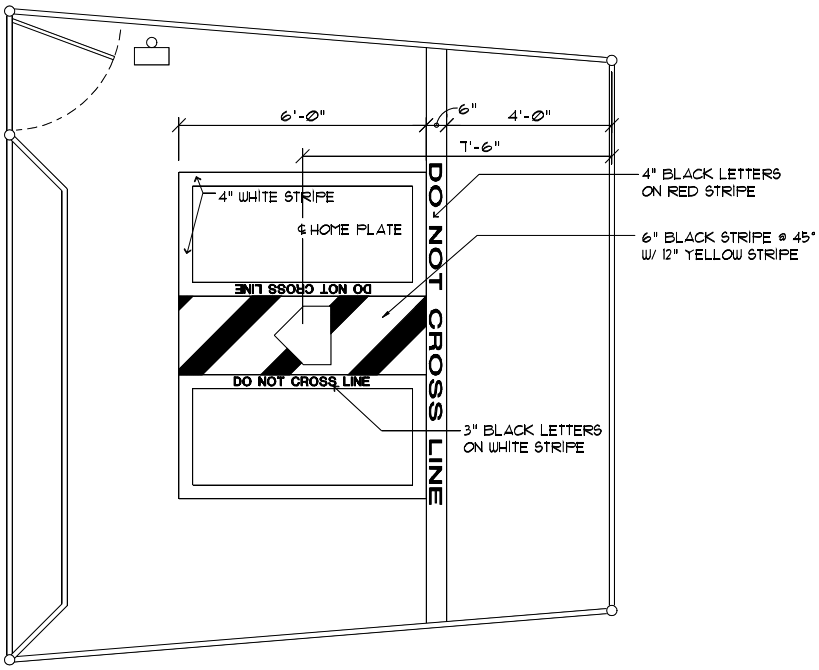

figure 1.0

Batter's Box Layout

IMPORTANT INFORMATION

WINCH & CENTER POLE COLLAR STOPS

IN ALL CASES, THE CENTER POLE WINCH AND COLLAR ASSEMBLY MUST ONLY BE USED WITH "CENTER POLE COLLAR STOPS" WELDED IN PLACE ON THE CENTER POLE. THESE STOPS SHOULD HAVE BEEN WELDED ONTO THE CENTER POLE AT THE INITIAL CONSTRUCTION PHASE. THEY WERE (AND ARE) ILLUSTRATED ON THE ORIGINAL "ABC" CONSTRUCTION BLUE PRINTS AND ILLUSTRATED IN THE ENCLOSED DRAWING. "ABC" WILL PROVIDE THESE COLLAR STOPS AT NO CHARGE. THESE STOPS WORK AS AN EMERGENCY COLLAR STOP. WINCHES SHOULD NEVER BE USED WITHOUT THESE COLLAR STOPS! IF THESE STOPS ARE NOT IN PLACE, DO NOT OPERATE THE WINCH.

NOTICE!

"ABC" HAS BEEN OFFERING TO SELL CENTER POLE WINCHES AND CABLES THAT WE BELIEVE ARE OF SUFFICIENT QUALITY AND OF SUFFICIENT LIFTING CAPABILITY. HOWEVER, FAILURES CAN OCCUR WHICH MAY RESULT IN THE COLLAR FALLING UNCONTROLLABLY. WITHOUT CENTER POLE STOPS, SERIOUS INJURIES MAY RESULT!

IF YOU HAVE ANY QUESTIONS REGARDING THE USE, SAFETY AND OPERATION OF THESE WINCHES OR CABLES, CONTACT YOUR LOCAL OSHA INSPECTOR AND/OR LOCAL ENGINEER TO SATISFY YOUR CONCERNS. REFER TO PAGES 115-137 FOR DRAWINGS, CONNECTIONS DETAILS AND LOAD RATINGS.

BATTING CAGE CONTROL COMPUTER
MODEL MP04A1
OPERATION MANUAL

(Pages 13 thru 27)

THE WARRANTY ON THIS PRODUCT IS NOT VALID UNTIL
THIS OPERATION MANUAL HAS BEEN READ

TABLE OF CONTENTS (PROCESSOR MANUAL)

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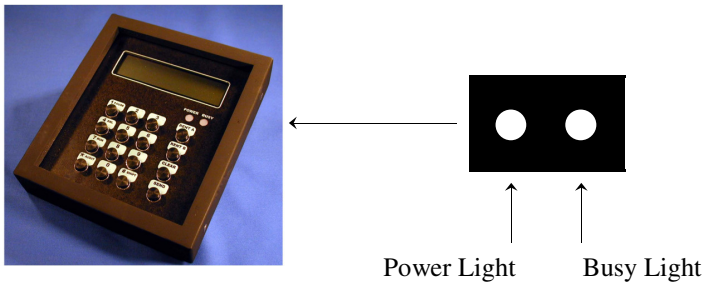
CONTROL COMPUTER FEATURES

A) LCD Display
B) Time (15, 30, 45, 60 and 90 minutes) Ball (50,100,150 and 250 balls) "Rentals"
C) Run, Pause or Delete all or individual games from the office
D) Machine A or Machine B Rentals
E) Free Play Feature
F) 1 to 30 cages controlled (60 pitching machines)
G) Allow monitoring of the remaining or the balls left to be pitched in any cage at any time
H) Provide a control and auditing system that cannot be circumvented or altered by employees
I) Permit programmable control of the number of balls to be pitched and the number of coins collected per game
J) Allow auditing of the keypad to determine the number of times each function has been used

CONTROL COMPUTER DESCRIPTION

Model MP04A1 is a microprocessor controlled batting cage computer. It provides control and auditing of 1 to 30 cages from an office.



EMERGENCY PROCEDURES

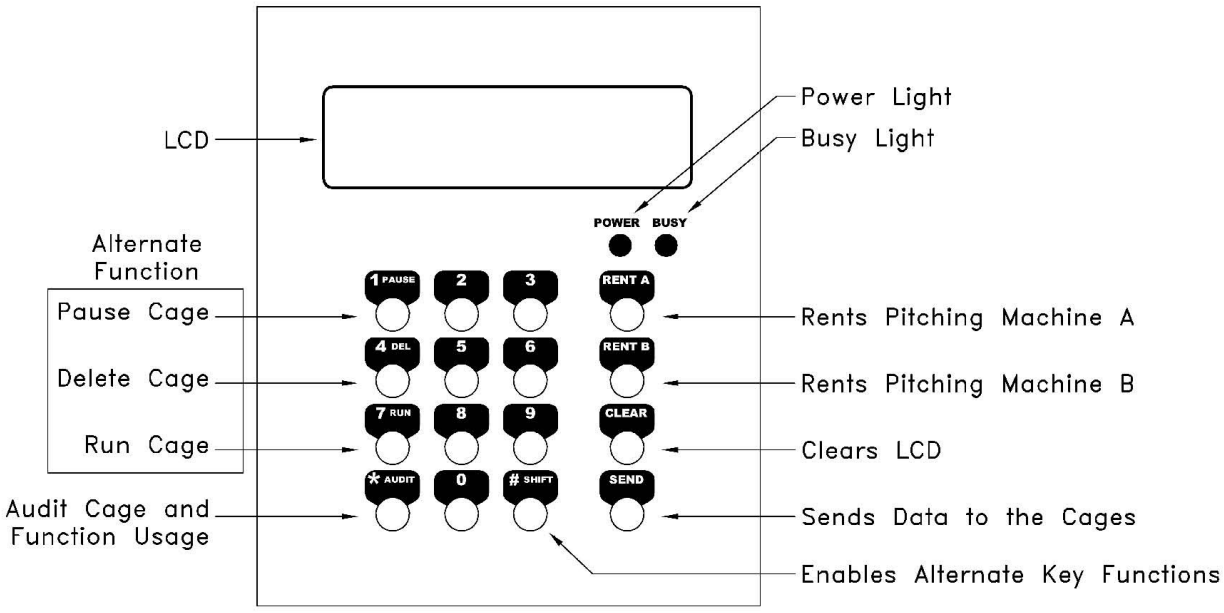
The Batting Cage Control System is not designed to be a safety system. It is only designed to provide specific control of batting cages. Safety is the responsibility of the batting cage owners & operators through proper operating procedures.

QUICKLY PAUSE ALL CAGES FROM MASTER PANEL

The quickest way to stop all cages is to put them into pause mode by: **PRESS "#" button then "Clear" button.** (This will pause all cages. This will give the batting cage operators time to decide which cages to **RUN** and which cage to **DELETE**. Pausing is preferable to deleting because customers do not lose games that they have paid for.

Press "#"
Press "Clear"

Keypad



FIRMWARE UPDATES

This Manual is for Master Panel Model MP04A1 with firmware "PGM 909602." This Manual applies to Master Panels manufactured with firmware update after March 1, 2006.

If "Mach A" or "Mach B" is displayed when "Clear", "1", "Rent A", or "Rent B" is entered, then you have the latest firmware "PGM 909602." (Contact ABC for firmware updates.)

REQUESTING CAGE INFORMATION

To find out the status of any cage:

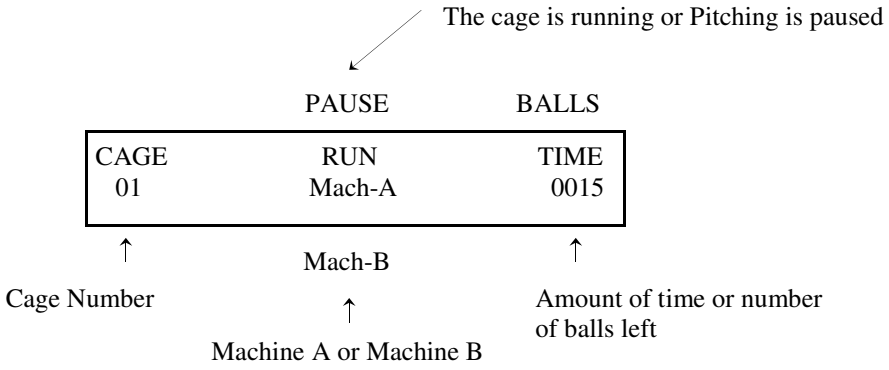
1. Press "Clear"
2. Enter the cage number "1-30"
3. Press "Send"

The "**Busy**" light will come on while the computer gets data from the cage. If no cage is connected at that cage number, the display will show.

CAGE
01

If the cage is connected and the cage is not being used, the display will show. The display will show any of the following operating conditions:

CAGE	OFF
01	0000



NOTE: The information on the display does not change until new data is requested.

SPECIAL FEATURES

FREE PLAY

To Start Free Play:
1) Press "Clear"
2) Press "0" for all cages {default} or enter the cage number "1-30"
3) Press "#"
4) Press "Rent A"
5) Press "1"
6) Press "Send"

NOTE: The Computer will not indicate the cage is in Free Play.

CAGE	FREE
00	

Figure A

ENDING FREE PLAY

To End Free Play From the Computer:
1) Press "Clear"
2) Press "0" for all cages {default} or enter the cage number "1-30"
3) Press "#"
4) Press "4, 5, or 6"
5) Press "Send"

CAGE	DEL
00	

Figure B

BALLS

RENTING

To Rent Balls:

1. Press "Clear"
2. Enter the cage number "1-30"
3. Press "Rent A" for Mach-A or "Rent B" for "Mach-B"
4. Enter the number of balls to rent "50, 100, 150, 200 or 250"
5. Press "Send"

The display will show figure **1** for Machine A or figure **2** for Machine B. When "**Send**" is pressed "**Rent**" will change to "**Run**." Balls will start pitching when "**Run**" is activated at the cage or Master Control Panel.

CAGE	RENT	BALLS
01	Mach-A	0050

Figure 1

CAGE	RENT	BALLS
01	Mach-B	0050

Figure 2

TIME

To Rent Balls:

1. Press "Clear"
2. Enter the cage number "1-30"
3. Press "Rent A" for Mach-A or "Rent B" for Mach-B
4. Enter the number of time to rent "15, 30, 45, 60 or 90"
5. Press "Send"

The display will show figure **3** for Machine A or figure **4** for Machine B. When "**Send**" is pressed "**Rent**" will change to "**Pause**." Balls will start pitching when "**Run**" is activated at the cage or Master Control Panel.

CAGE	RENT	TIME
01	Mach-A	0015

Figure 3

CAGE	RENT	TIME
01	Mach-B	0015

Figure 4

GAME

To Rent Balls:

1. Press "Clear"
2. Enter the cage number "1-30"
3. Press "Rent A" for Mach-A or "Rent B" for Mach-B
4. Enter "11"
5. Press "Send"

The display will show figure **5** for Machine A or figure **6** for Machine B. The number displayed under "**GAME**" is the number of balls that will be pitched. This number is set in the Programming mode under **Balls/Vend**. When "Send" is pressed "**Rent**" will change to "**Pause**." Balls will start pitching when "**Run**" is activated at the cage or Master Control Panel.

CAGE	RENT	GAME
01	Mach-A	0018

Figure 5

CAGE	RENT	GAME
01	Mach-B	0018

Figure 6

RUNNING, PAUSING AND DELETING GAMES

Running when a game is paused

To run games:

1. Press “Clear”
2. Press “0” for all cages [default] or enter the cage number “1-30”
3. Press “#”
4. Press “7, 8 or 9”
5. Press “Send”

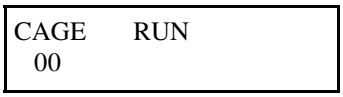


Figure 7

Pausing when a game is running

To pause games:

1. Press “Clear”
2. Press “0” for all cages [default] or enter the cage number “1-30”
3. Press “#”
4. Press “1, 2 or 3”
5. Press “Send”

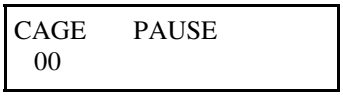


Figure 8

Deleting

To delete games:

1. Press “Clear”
2. Press “0” for all cages [default] or enter the cage number “1-30”
3. Press “#”
4. Press “4, 5 or 6”
5. Press “Send”

Figure 9

AUDITING

TIME

To find out how many times "15, 30, 45, 60 or 90 minutes" have been rented:

1. Press "Clear"
2. Press "*"
3. Press "1, 2, 3, 4 or 5" for 15, 30, 45, 60 or 90" minute rental

The number displayed under "MEM" is the memory location. The number displayed under "TIME" represents the number of times that this function has been used. In this example we are checking memory location **1** which is for "15 minute time rental"; the number under "TIME" shows that this function has only been used once.

CAGE	MEM	GAME
00	01	0001

Figure 10

BALL

To find out how many times "50, 100, 150, 200 or 250 balls" have been rented:

1. Press "Clear"
2. Press "*"
3. Press "6, 7, 8, 9 or 10" for 50, 100, 150, 200 or 250" ball rental

The number displayed under "MEM" is the memory location. The number displayed under "BALLS" represents the number of times that this function has been used. In this example we are checking memory location **10** which is for "250 ball rental"; the number under "TIME" shows that this function has only been used once.

CAGE	MEM	GAME
00	10	0001

Figure 11

GAME

GAME, PAUSE and RUN USAGE

To find out how many times a game has been rented from the computer:

1. Press “Clear”
2. Press “*”
3. Press “11”

The number displayed under “MEM” is the memory location. The number displayed under “GAME” represents the number of times that this function has been used. In this example we are checking memory location **11** which is for “Game Rental”; the number under “GAME” shows that this function has only been used once.

CAGE	MEM	GAME
00	11	0001

Figure 12

PAUSE

To find out how many times the pause function has been used from the computer:

1. Press “Clear”
2. Press “*”
3. Press “14”

The number displayed under “MEM” is the memory location. The number displayed under “PAUSE” represents the number of times that this function has been used. In this example we are checking memory location **14** which is for “Game Pausing”; the number under “PAUSE” shows that this function has only been used once.

CAGE	MEM	PAUSE
00	14	0001

Figure 13

RUN

To find out how many times the start function has been used from the computer:

1. Press “Clear”
2. Press “*”
3. Press “13”

The number displayed under “MEM” is the memory location. The number displayed under “RUNS” represents the number of times that this function has been used. In this example we are checking memory location **13** which is for “Game Run”; the number under “RUNS” shows that this function has only been used once.

CAGE	MEM	RUNS
00	13	0001

Figure 14

DELETE and COIN GAMES USAGE

DELETE

To find out how many times the delete function has been used from the computer:

1. Press “Clear”
2. Press “*”
3. Press “12”

The number displayed under “MEM” is the memory location. The number displayed under “DEL” represents the number of times that this function has been used. In this example we are checking memory location **12** which is for “Game Deleting”; the number under “DEL” shows that this function has only been used once.

CAGE	MEM	DEL
00	12	0001

Figure 15

COIN GAMES

To find out how many coins have been dropped into a cage:

1. Press “Clear”
2. Press “*”
3. Press “16”
4. Enter the cage number “1-30”
5. Press “Send”

To find out how many coins have been dropped into another cage repeat steps 4 and 5. To exit from Auditing mode press “C.” The number displayed under “MEM” is the memory location. The number displayed under “CAGE” represents the cage number. The number displayed under “COINS” shows the number of coins that have been dropped into this cage. In this example we are checking memory location **16** which is for “COINS”; the number under “CAGE” shows that we are checking Cage 1, and the number under “COINS” shows that only one coin has been dropped into this cage.

CAGE	MEM	COINS
01	16	0001

Figure 16

PROGRAMMING

NOTE: Refer to page 24 for recommended programming.

ENTERING PROGRAM MODE

To enter the programming mode:

1. Press “Clear”
2. Press “31”
3. Enter the computer code i.e. “1234”

If the correct code is entered the display will change to the programming screen. (Figure 18.)

If the wrong code is entered press “#” and start over.

You need to be in the programming mode to change the coins/ vend, balls/vend or the cage number.

CAGE	CODE
00	

Figure 17

PGM	C/VEN	B/VEN
000	001	0018

Figure 18

COINS PER VEND

To change the number of coins needed to start a game:

1. Enter the number of coins “1-255”
2. Press “Rent A”
3. Press “Send”

BALLS PER VEND

To change the number of balls pitched per game:

1. Enter the number of balls “1-255”
2. Press “Rent B”
3. Press “Send”

NOTE: Disconnect all cages from line except the cage you are going to program otherwise any cage connected to the line will have its cage number changed also.

Cage Number

To program a cage number:

1. Press “Clear”
2. Enter the cage number “1-30”
3. Press “*”
4. Press “Send”

EXITING PROGRAM MODE

Press “#” to exit from the programming mode

APPENDIX A – BASEBALL PANEL FUNCTIONS

FUNCTION	KEY 1	KEY 2	KEY 3	KEY 4	KEY 5
Request Run	Clear	1-30	Send		
Rent Baseball	Clear	1-30	Rent A	Time / Balls (1)	Send
Rent Balls / Vend	Clear	1-30	Rent A	11	Send
Rent Softball	Clear	1-30	Rent B	Time / Balls (1)	Send
Rent Balls / Vend	Clear	1-30	Rent B	11	Send
Stop all Games	Clear	0	#	1	Send
Stop a Game	Clear	1-30	#	1	Send
Restart all Games	Clear	0	#	7	Send
Restart a Game	Clear	1-30	#	7	Send
Delete all Games	Clear	0	#	4	Send
Delete a Game	Clear	1-30	#	4	Send
Display Rents	Clear	*	1-14		
Display Cage Rents	Clear	*	16	1-30	
Enter Program Mode	Clear	31	Code (2)		
Program Balls	Enter Balls (3)	Rent B	Send		
Program Coins	Enter Coins (3)	Rent A	Send		
Program Cage Numbers	Clear	1-30	*	Send	
End Program Mode	#				

(1) Valid Time Rentals 15, 30, 45, 60 & 90 (1) Valid Ball Rentals 50, 100, 150, 200 & 250
(2) 4 Digit Managers Code
(3) Valid Numbers 1-255

Memory Location		Memory Location	
1	15 Minute Time Rental	9	200 Ball Rental
2	30 Minute Time Rental	10	250 Ball Rental
3	45 Minute Time Rental	11	Game Rental
4	60 Minute Time Rental	12	Deletes
5	90 Minute Time Rental	13	[Re-] Start
6	50 Ball Rental	14	Pauses
7	100 Ball Rental	15	Not Used
8	150 Ball Rental	16	Coins

PROGRAMMING BALL & COIN COUNTS

PT-7 RECOMMENDED PROGRAMMING PROCEDURE

(Note: Refer to diagram on page 51 for the SIO2 location of procedures listed below.)
(All programming must be done from light box)

Before programming:
1. Open light box door to accesses PT-7 Circuit Board
2. Make sure Blue jumper clip is connected to both pins on circuit board
3. Unplug low voltage cable from the right SIO2 computer jack
4. Plug the display panel into right SIO2 jack
5. Verify computer panel power light is on
6. Proceed to program using example below
7. After programming is complete BLUE remove jumper clip and re-attach to only 1 pin

Note: The ball switch of the cage that you want to program must be activated during programming. This can be accomplished by holding down the ball count micro switch. Any cage that has the ball switch activated will have its cage number changed also.

TO PROGRAM A CAGE NUMBER
1. Press " C " (" Clear ")
2. Enter " 31 "
3. Enter the code "1234 "
4. Press " C " (" Clear ")
5. Enter the cage number " 1-30 "
6. Press " * "
7. Activate and hold the ball count micro switch
8. Press " D " (" Send ")
9. Deactivate the ball count micro switch
10. Press "#"

TO PROGRAM ONLY THE COIN AND BALL AMOUNTS FOR ALL CAGES FROM THE OFFICE OR FROM CAGE 1 LIGHT BOX

1) Plug in all light boxes, make sure jumper clip is installed on both pins for cage 1.
2) Press " C " (" Clear ")
3) Enter " 31 "
4) Enter " 1234 "
5) Enter number of coins " 1 - 100 "
6) Press " A " (" Rent A ")
7) Press " D " (" Send ")
8) Enter number of balls " 1 - 255 "
9) Press " B " (" Rent B ")
10) Press " D " (" Send ")
11) Press " # "

NOTE: CAGE #1 SHOULD ALWAYS HAVE BLUE JUMPER CLIP ATTACHED TO BOTH PINS

OPERATING MODES

The Baseball System has the following features that can be set or cleared:

Mode	Description	Set	Cleared
0	This mode affects how a baseball or softball is selected in a **Time Rental**. If this mode is set, baseball or softball is selected with the "**Run/Start**" button. If this mode is cleared, baseball or softball is selected with a coin drop.	1	0
1	**Mode 1** and **Mode 2** affect how a baseball or softball game is selected and run in a **Game Rental**. If this mode is set, baseball or softball is selected with a coin drop and activated with a "**Run/Start**" button. If this mode is cleared, **Mode 2** is enabled.	2	0
2	**Note:** This mode is only enabled if **Mode 1** is cleared. Mode 1 and Mode 2 affect how a baseball or softball game is selected and run in a **Game Rental**. If this mode is set, baseball or softball is selected and run with the **"Run/ Start A"** or **"Run/Start B"** button. If this mode is cleared, baseball or softball is selected and run with a coin drop.	4	0
3	(Implemented in Light Boxes with PGM 917103 and later.) If this mode is set, the light box does not go into the **"pause"** mode after a game has been pitched. **Mode 7** should be cleared.	8	0
4	This mode tells the computer if there is only one machine at this cage. If this mode is set, **"B"** rental is enabled. If this mode is cleared, **"B"** rental is disabled.	16	0
5	This mode enables or disables missing ball shutdown. If this mode is set, the cage changes to the **"pause"** condition when no ball is pitched within 1 minute. Pitching can be resumed by pressing the **"Run/Start"** button.	32	0
7	This mode enables or disables the accumulation of coins after run/start is activated. If this mode is set, multiple games can be rented by dropping in multiple coins after run/start button is activated. If this mode is cleared, multiple games can only be rented until run/start is activated; any more coins dropped in after run/start is activated do not accumulate games.	128	0

These modes are programmed into the computer by adding the mode numbers. For example, if modes 0 and 2 are cleared and modes 1, 4, 5 and 7 are set, the operating number is 178.

NOTE: Disconnect all cages from line except the cage you are going to program otherwise any cage connected to the line will have its mode changed also.

NOTE: Balls/vend and Coins/vend will have to be re-entered after setting the modes.

Mode 0 disabled	0
Mode 1 disabled	2
Mode 2 disabled	0
Mode 4 enabled	16
Mode 5 enabled	32
Mode 7 enabled	+128
Operating Number	178

To change the operating mode:
1. Enter "255"
2. Press "Rent A"
3. Enter the operating number (0-255)
4. Press "Rent B"
5. Press "Send"

To change the LCD contrast:
1. Enter "253"
2. Press "Rent A"
3. Enter the level of contrast (0-255) (1=lowest contrast 255=highest contrast
4. Press "Rent B"
5. Press "Send"

Warning Light Brightness

This setting allows you to change the level of brightness of the warning lights.

To change the warning lights brightness:
1. Enter "254"
2. Press "Rent A"
3. Enter the level of brightness (0-255)
4. Press "Rent B"
5. Press "Send"

Settings:
1 to 128 → Dimming Range
129 to 255 → Full Brightness

Note: Balls/vend and Coins/vend will have to be re-entered after setting the mode and the warning light brightness.

Exiting Program Mode: (Press "#" to exit from the programming mode.)

MP04A1 ABBREVIATED OPERATING INSTRUCTIONS

NOTE: 1) **A = Machine A B = Machine B**
2) **When** *(Cage Number)* **is listed in the sequence press the number of the cage you wish to respond.**
3) **If you get out of sequence, start over with first symbol in sequence.**

PAUSE ALL CAGES - "Clear" 0 # 1 "Send"

PAUSE INDIVIDUAL CAGE - "Clear" *(Cage Number)* # 1 "Send"

RE-START ALL CAGES - "Clear" 0 # 7 "Send"

RE-START INDIVIDUAL CAGE - "Clear" *(Cage Number)* # 7 "Send"

DELETE ALL CAGES - "Clear" 0 # 4 "Send"

DELETE INDIVIDUAL CAGE - "Clear" *(Cage Number)* # 4 "Send"

MANUAL GAME - "Clear" *(Cage Number)* "Rent A" **or** "Rent B" 11 "Send"
(NOTE: *A or B must be selected – Machine A = A Machine B= B)*

30 MINUTE RENTAL - "Clear" *(Cage Number)* "Rent A" **or** "Rent B" 30 "Send"
(NOTE: *A or B must be selected – Machine A = A Machine B = B)*

60 MINUTE RENTAL - "Clear" *(Cage Number)* "Rent A" **or** "Rent B" 60 "Send"
(NOTE: *A or B must be selected – Machine A = A Machine B = B)*

90 MINUTE RENTAL - "Clear" *(Cage Number)* "Rent A" **or** "Rent B" 90 "Send"
(NOTE: *A or B must be selected – Machine A = A Machine B = B)*

MP04A1 ABBREVIATED AUDITING INSTRUCTIONS

You will use this mode to determine total use of the cage different operation.

Time Rentals – All Cages

Clear * (Time Category / 1 - 5) **Legend**

1 = 15 Minutes
2 = 30 Minutes
3 = 45 Minutes
4 = 60 Minutes
5 = 90 Minutes

Example: Clear * 4 will display total amount of 60 minute rentals

Ball Quantity Rentals – All Cages

Clear * (Ball Quantity / 6 – 10) **Legend**

6 = 50 Balls
7 = 100 Balls
8 = 150 Balls
9 = 200 Balls
10 = 250 Balls

Example: Clear * 6 will display total 50 ball rentals

Manual Games – All Cages

Clear * 11

Deletes – All Cages

Clear * 12

Games Per Cage – Total Coins on Individual Cage

Clear * 16 (Cage Number) Send

ELEVATION CONTROL SYSTEM FOR ABC'S BATTING RANGE SYSTEM

Pages 28 thru 30

ELEVATION CONTROL SET-UP PROCEDURE

1) Connect light box to power.

2) Move LED on elevation control panel below center position at least two lights, then back up to center position. ***Leave in center position.***

3) Manually adjust pitching machine so balls are pitching at waist level.

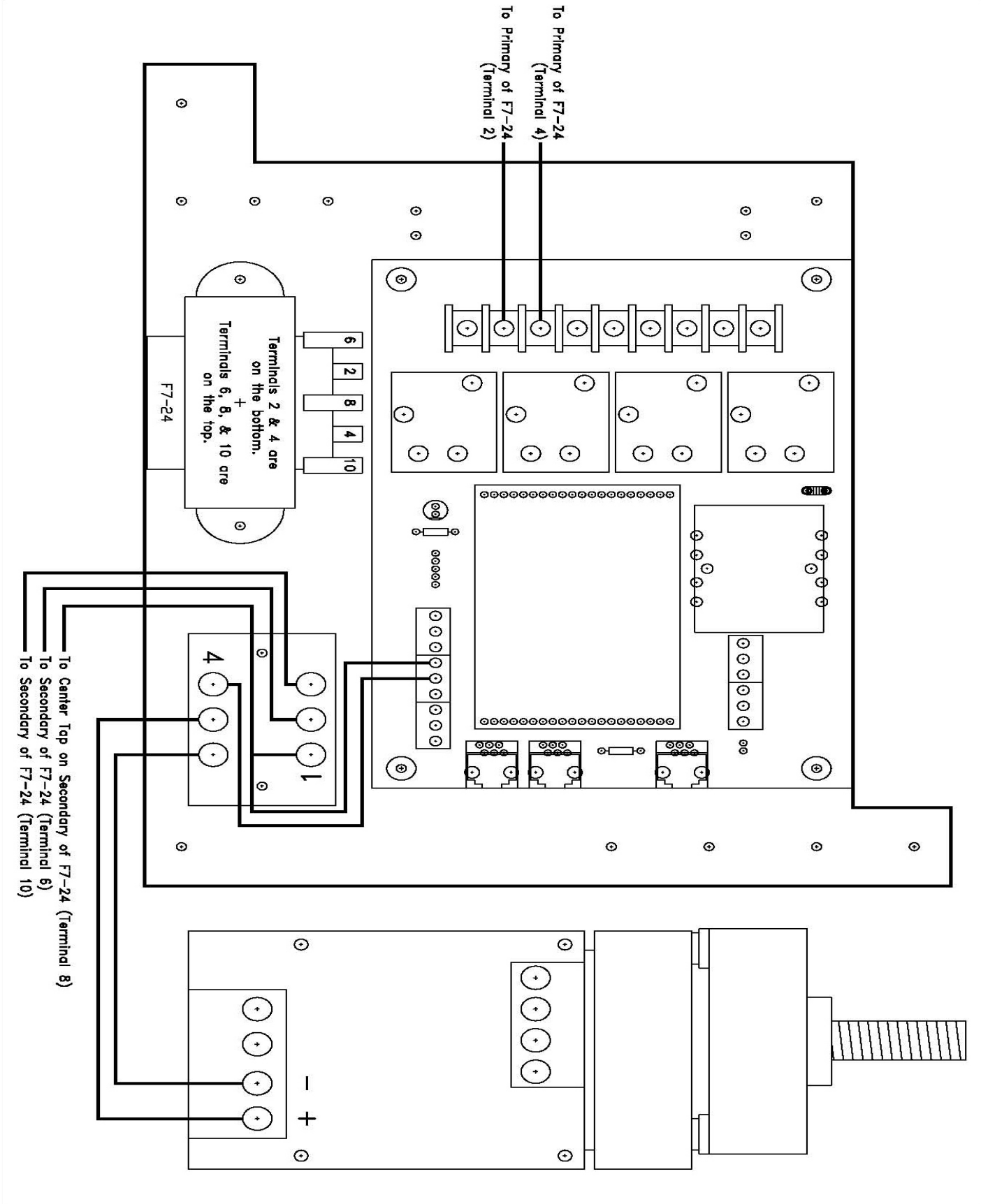
4) Loosen Stop Collar and screw forward until it comes in contact with Hi/Lo Adjust Bar.

5) Move Stop Collar 4 turns backwards (towards motor). Tighten allen head bolt on Stop Collar.

6) Go to LED panel and enter program code by using the up/down buttons.
Program Sequence: Start game on baseball machine. *(Hint: Enter a Time Rental and do not press the Start Button. This will keep any balls from being pitched)* **Simultaneously hold down both buttons until button lights go out. Slowly Press: Up Down Up Up Down Up Down Down**

7) Elevation motor will reset. Pitch some baseballs. Pitches should be at desired middle height. If not you must re-adjust Stop Collar and repeat Program Sequence. **Do not move LED from center position.** To **raise** pitch, loosen Stop Collar and turn **backwards** 1 turn. To **lower** pitch, loosen Stop Collar and move **forward** 1 turn. After either adjustment, re-tighten Stop Collar and repeat Program Sequence described in Step 6.

8) Elevation Control System set-up is complete when desired middle height is achieved.


To Primary of F7-24 (Terminal 4)
To Primary of F7-24 (Terminal 2)
Terminals 2 & 4 are on the bottom.
+
Terminals 6, 8, & 10 are on the top.
F7-24
6
2
8
4
10
To Center Tap on Secondary of F7-24 (Terminal 8)
To Secondary of F7-24 (Terminal 6)
To Secondary of F7-24 (Terminal 10)
4
1
-
+

TROUBLE SHOOTING GUIDE FOR ABC'S BATTING RANGE SYSTEM

Pages 31 thru 42

REFER TO PAGE 50 FOR CIRCUIT BOARD LOCATIONS

TROUBLE SHOOTING GUIDE

CAUTION! EMPLOYEES SHOULD ALWAYS WEAR A BATTING HELMET WITH FACE GUARD AND SOUND A WARNING FOR BATTERS TO LEAVE BATTING STALLS DURING MAINTENANCE OF EQUIPMENT

THIS EQUIPMENT SYSTEM HAS SEVERAL MOVING PARTS AND HIGH VOLTAGE PRESENT WHICH POSE POTENTIAL DANGER TO ANY PERSON SERVICNG OR MAINTAINING IT. BEFORE SERVICING OR MAINTAINING EQUIPMENT SYSTEM, YOU MUST REVIEW "MAINTENANCE" SECTION OF THIS MANUAL. SERIOUS INJURIES COULD RESULT IF NOT REVIEWED, UNDERSTOOD AND FOLLOWED!

This introduction is an explanation of how ABC's Batting Range System works from the initiation of the game to the completion of the game.

I. MP04A1 COMPUTER CONTROL PANEL

The Display Panel, or computer control panel, provides control and auditing of your batting cage. The control panel has an adjustable program which enables the operator to set any time, coin and ball amounts he/she decides to use for the range.

Please refer to the MP04A1 processor owners manual for operating instructions.

II. COIN BOX

The coin box and coin mechanism are linked to the light box via the Belden (low voltage) control cables. The coin mechanism provides an input to the light box which then activates the corresponding lights, pitching machine motor and pinch roller motor. This is achieved through a very simple process. The coin mechanism has two wires attached to its microswitches and coin mechanism interface, one wire carries a signal, the other is ground. When the coin drops through the coin mechanism and deflects the wire on the microswitch the signal is sent to the light box. The light box recognizes this as an "input/signal" and begins the process of starting a game.

III. LIGHT BOX

The light box is the device which directs several functions of the batting cage; the pitching machine motor, warning lights, pinch roller motor and agitator motor all receive their operating current from the controller block located on the circuit board. The light box is activated by a signal sent from the Coin box. The light box will operate until the number of balls have been pitched or the game deleted. The ball count microswitch (attached to the pitching machine ball chute) provides "inputs/signals" (pitched balls) to the controller block. When the programmed amount of pitched balls ("input/signal") are received by the controller block, the signal is discontinued and all functions of the cage stop (except for the pitching machine). The pitching machine will continue to run for approximately 8 - 10 minutes, but no balls will be pitched until a new game is activated at the coin box or manually at the display panel.

IV. PITCHING MACHINE

The Pitching machine is the heart of the batting range. Maintenance, servicing, and operating instructions are described throughout the various sections of this manual. The principle behind the pitching of the ball is simply based on the RPM's of the wheels (or wheel) and the amount of "pinch" on the ball. The two wheels rotate in the opposite directions and at different RPM's to create the proper "backspin" on the ball. The velocity of the pitch is achieved when a ball is pinched between the wheels and is accelerated by the rotating wheels.

V. AUTOMATIC CONVEYOR SYSTEM

The Automatic conveyor system's function is to collect the balls, carry them up to the hopper level, sort the baseballs from the softballs and deliver them to the ball chutes. The conveyor drive motor rotates the top conveyor pulley, which drives the conveyor belt. Both the baseball and the softball hoppers have a "Chinese hat" that agitates the balls with its rotating action. Each Chinese hat is driven by an electric motor. After falling into the hoppers, the balls leave through the exit holes and roll down the ball chutes.

IMPORTANT TROUBLE SHOOTING INFORMATION

In order to effectively trouble shoot a problem in your batting range you must first determine where the problem is located. In most cases a problem will develop because of a component failure or a bad electrical connection. The first step, in all cases, will be to look at your master office control panel to see if the game has registered in that particular cage. If the game has registered, proceed to the Light Box Section of this guide. If it does not register on the display panel proceed to the Coin Box Section.

The sequence of a normal game is:

1) Game is activated either by coin or "manually" through the microprocessor.
2) The pitching machine and the yellow light of the light box are activated.
3) The red light and pinch roller begin to operate, balls begin to pitch.
4) After the programmed amount of balls have been thrown, all functions stop except the pitching machine. No balls will be thrown, but the pitching machine will continue to run for approximately 8 - 10 minutes on the "off delay" cycle.

It is very important to observe the sequence of this operation and to take note of what is not happening, or what is out of sequence. This will enable you to understand how the system works and direct you to the specific problem area. If any problems occur that are not listed in the manual please call the Service Department at ABC.

When trouble shooting "Dual Machine Systems" separate circuits are present for different functions. This would apply to the Coin box, Light box, and Pinch rollers. "A" circuit represents "front" or baseball system, "B" circuit represents "rear" or softball system.

HAVING TROUBLE WITH YOUR...

MP04A1 MASTER CONTROL PANEL

PROBLEM	SOLUTION
As I enter a function into the Master Panel the display changes, erasing all the information that I have entered.	The Light Box is sending data i.e. balls left or time remaining to the Master Panel and it is overwriting the entered information. Pressing "C" before you enter a function will stop the cage from sending data.
Incorrect or unusual information is displayed on the master Panel.	The Light Box and the Master Panel are sending data at the same time. Press "C" and resend the computer data.
Why can't I enter any ball or time amount that I want.	Allowing any ball or time amount to be entered can not be stored in auditing. This prevents your customers from getting less or more time or balls than what they paid for.
Nothing happens when I "RUN" a game.	"RUN" will only work if the cage is in "PAUSE." If the computer does not show "PAUSE" when you check the cage status, then "RUN" will not work. Rent a game first, the use "RUN."
When you Rent a game longer than 60 min. the machine shuts down before the time is up.	There is a timer that resets the machine after 60 minutes, if there are no balls pitched or inputs from the Coin Mech or Computer. This feature resets the machine when no one is using it for 60 minutes. Free Play mode should be used when you want to disable this feature.

I. MP04A1 COMPUTER CONTROL PANEL

PROBLEM	CAUSE	SOLUTION
Display Panel Has No Power	1a) No power at the outlet *** If there is power at outlet move to step 2**	Check circuit breaker at service panel for the end stall light box outlet. (**This will be one of the end stalls and the light box will have 3 low voltage cables going into it**).
	1b) No power "120VAC" at light box terminal strip.	Check for 120VAC between "black" and "white" wires located at the bottom right of the terminal strip. If no power, check power cord and cord end.
	1c) No power at primary side of transformer (2 wire side).	If there is no 120VAC at primary side (2 wire side) of transformer, repair or replace circuit board.
	1d) No power at secondary side of transformer (3 wire side).	If there is 120VAC at primary (2 wire side) section but no 12VAC from secondary (3 wire side) section, repair or replace circuit board.
	2a) The light box is not plugged in.	Verify light box for the end stall that has 3 low voltage cables going into the light box is plugged in.
	2b) Blue jumper clip is not installed on circuit board	A) Verify the end stall light box has the blue jumper clip installed on both pins of the circuit board. B) Verify blue jumper clip is installed on the end cage only, all other cages the jumper clip should not be connected to both pins.
	2c) Low voltage wire from display panel to the end stall light box is plugged in wrong	Verify low voltage cable is plugged into the SIO2 computer jack of the end stall circuit board
	2d) Low voltage wire from display panel to end stall light box is bad	A) Take display panel down to end stall light box and plug directly into SIO2 computer jack of circuit board B) If display panel does not power up when plugged in at light box call ABC Service Dept.
	2e) Low voltage wire from display panel to light box are bad	Check terminal connectors on low voltage wire, check low voltage wire for cuts, repair or replace wire if needed.

II. COIN BOX

PROBLEM	CAUSE	SOLUTION
Customer inserts token into coin mechanism and it does not register on the display panel.	1a) Token in coin return	Pull token out of coin return and try again.
	1b) Token stuck in coin mechanism.	Open coin mechanism by pinching the two tabs together and pulling. Mechanism will hinge out, then dislodge token.
	1c) Wire whisker on coin mechanism micro switch needs adjustment.	If coin is not registering, bend wire in manner to make it longer. If multiple counts are registering from one coin, bend the wire in manner to make it shorter.
	1d) Defective coin mechanism micro switch	Unplug the two wires connected to the micro switch and touch them together then release, if nothing registers on display panel call ABC.
	1e) Wire in coin box is bad.	Inspect wire going to micro switch for nicks, cuts, or pinches. Repair as needed.
When game is in rent (time) mode. Customer pushes "rent" button on coin box but game does not activate.	1a) Connections or wire from coin box to light box is bad.	Check connections between rent button and light box. Repair or replace.
	1b) Defective "rent button" on coin box.	Remove wires from rent button and touch together, if this works then replace the rent button.
	1c) Defective "coin mech. interface"	Check for 5VDC on coin mech interface "run" screw t. This will have the wire going to rent button micro switch normally open (N.O.) connection.

III. LIGHT BOX

PROBLEM	CAUSE	SOLUTION
Token inserted in coin mechanism, but game does not begin.	1a) No power at electrical outlet that the light box is plugged into.	Check circuit breaker at service panel
	1b) Controller block memory is scrambled.	Re-program controller.
	1c) No power “120VAC” at light box terminal strip.	Check for 120VAC between “black” and “white” wires located at the bottom right of the terminal strip. If no power, check power cord and cord end.
	1d) No power at primary side of transformer (2 wire side).	If there is no 120VAC at primary side (2 wire side) of transformer, repair or replace circuit board.
	1e) No power at secondary side of transformer (3 wire side).	If there is 120VAC at primary (2 wire side) section but no 12VAC from secondary (3 wire side) section, repair or replace circuit board.
	1f) Low voltage line plugged into circuit board SIO1 coin line incorrectly.	Verify the low voltage line from the coin box is plugged into the SIO1 Coin line on the circuit board.
	1g) Yellow or Red "LED" light wires grounded to light box.	Verify the yellow and red "LED" light wires are not touching the light box where connected to the "LED" lights.
	1h) Coin mechanism Micro switches are bad.	Remove wires from micro switch and touch them together, if game starts then one or both micro switches are bad.
	1i) Low voltage wire is bad.	Check for 12VDC on circuit board SIO1 Coin line, then verify you have 12VDC at the coin mech interface + and -.
	1j) Coin mech wire harness is bad.	Check for 12VDC on coin mech interface + and -, then verify you have 5VDC at end of micro switch wires.
	1k) Defective "8738 / 9633" coin mech interface	Remove white (and red if dual cage) wires from coin mech interface. Check for 12VDC on coin mech interface + and -, then verify you have 5VDC from coin mech interface - to the white wire interface screw (and to the red wire interface screw if a dual cage)
	1l) Defective "8894" controller block	Repair or replace circuit board.

III. LIGHT BOX

PROBLEM	CAUSE	SOLUTION
Token inserted in coin box, all components begin operation except "yellow light".	1a) Controller block memory is scrambled.	Re-program controller.
	1b) No triggering voltage to yellow "LED" light from "Controller Block".	Check for 6 - 9VDC (light off) on the circuit board "LED yellow" terminal block connector. Check for .8 - 1.5VDC (light on) on the circuit board "LED yellow" terminal block connector.
	1c) Defective yellow "LED" light	Replace yellow "LED" light.
	1d) Bad light box ground	Repair ground connections.
	1e) "LED" wire harness is bad	Check wires for loose connections, nicks, frayed wire. OHM out wire harness, replace if bad.
	1f) Defective "8894" controller block	Repair or replace circuit board.
Token inserted, all components begin operation except pitching machine.	1a) No power to pitching machine. **To isolate problem, unplug light box and plug pitching machine directly into outlet. If motor runs, plug pitching machine back into light box and proceed to step 2.**	If pitching machine does not run check for 115VAC where power cord connects to motor.
	1b) Reset button popped	Press reset button on motor
	1c) Bad motor	Replace motor
STEP 2 →	2a) Pitching machine power cord is unplugged or not plugged in correctly.	Verify the cord from the pitching machine is plugged into the correct light box plug. Pitching machine A cord to light box A cord, Pitching machine B cord to light box B cord.
	2b) Controller block memory is scrambled.	Re-program controller.
	2c) Loose wire on machine pigtail cord coming from light box.	Remove female end of plug and check for loose wires.
	2d) Defective "8557" machine relay	Repair or replace circuit board.
	2e) Defective "8894" controller block	Repair or replace circuit board.

III. LIGHT BOX

PROBLEM	CAUSE	SOLUTION
Token inserted, all components begin operation except red light. NOTE: Pinch Roller will not operate if red light is not functioning. This is a fail-safe condition built into the system.	1a) Controller block memory is scrambled.	Re-program controller.
	1b) No triggering voltage to red “LED” light from “Controller Block”.	Check for 6 - 9VDC (light off) on the circuit board "LED red" terminal block connector. Check for .8 - 1.5VDC (light on) on the circuit board "LED red" terminal block connector.
	1c) Defective red "LED" light	Replace red "LED" light.
	1d) Bad light box ground	Repair ground connections.
	1e) "LED" wire harness is bad	Check wires for loose connections, nicks, frayed wire. OHM out wire harness, replace if bad.
	1f) Defective "8894" controller block	Repair or replace circuit board.
Token inserted, all components begin operation except pinch roller.	1a) Controller block memory is scrambled.	Re-program controller.
	1b) Pinch roller set screw is loose on pinch roller motor shaft.	Tighten pinch roller split collar on the pinch roller wheel shaft. Align the slit of the split collar with the slit of the pinch roller wheel shaft. Tighten split collar on end of pinch roller wheel shaft closet to motor.
	1c) Bad or loose connection on power cord, going from “Light box” to “Pinch roller motor”.	Check wires for loose connection. Trace from light box to pinch roller motor, OHM wire.
	1d) Defective “8557” feed relay.	Repair or replace circuit board.
	1e) Defective red "LED" light	Replace red "LED" light.
	1f) Defective pinch roller motor	Disconnect pinch roller motor from light box wires and check for 120VAC at end of pinch roller cord coming from the light box.
	1g) Defective "8894" controller block	Repair or replace circuit board.

III. LIGHT BOX

PROBLEM	CAUSE	SOLUTION
Pinch roller begins operating when light box is plugged into outlet. No lights are on.	1a) Defective “8557” feed relay.	Repair or replace circuit board.
	1b) Defective "8894" controller block	Repair or replace circuit board.
Red light and pinch roller both come on as soon as token is inserted, (no delay between yellow)	1a) Defective "8894" controller block	Repair or replace circuit board.
Game has ended, lights go out, pinch roller stops, but pitching machine continues to run after the 10 minute “off delay”.	1a) Defective "8894" controller block	Repair or replace circuit board.
	1b) Defective “8557” machine relay.	Repair or replace circuit board.
Token inserted and both lights come on at the same time.	1a) Defective "8894" controller block	Repair or replace circuit board.
Pitching machine runs as soon as light box is plugged into power. No lights come on.	1a) Defective "8894" controller block	Repair or replace circuit board.
	1b) Defective “8557” machine relay.	Repair or replace circuit board.

TROUBLE SHOOTING GUIDE

IV. PITCHING MACHINE

PROBLEM	CAUSE	SOLUTION
Inaccurate count on pitched balls.	1a) Arm on micro switch is not bent enough to count balls accurately.	If pitching machine is pitching more balls than programmed for, bend arm on micro switch up slightly. If pitching machine is pitching fewer balls than programmed for, bend arm on micro switch down slightly.
	1b) Wires to micro switch have been knocked off or are loose	Check wire connection at micro switch, tighten or reconnect as needed. Crimp new fork terminal on wire if it has pulled out of fork terminal.
	1c) Defective “Ball Count micro switch”.	To verify remove wires from micro switch, touch them together and release. Every time you touch and release one ball should count down. Have someone observe display panel when conducting this test. If you obtain a count down on display panel with this test, replace micro switch.
	1d) Defective "8894" controller block	Check for 5VDC on the circuit board "ball" terminal block connector. Repair or replace circuit board if not present with wire removed..
Inaccurate pitches	1a) Incorrect wheel to wheel spacing or wheel to pad spacing.	Verify proper spacing, adjust if necessary. Refer to "Servicing Your Equipment" in service manual.
	1b) Wheels on machine are worn.	Inspect wheels for excessive wear, uneven wear, or chunks of material that are missing. Replace wheel “immediately”.
	1c) Wheels are not parallel to each other.	Make sure ball contact surfaces on wheels are parallel to each other. Adjust wheel shaft to correct alignment.
	1d) Balls are worn out.	Inspect balls for wear and replace as needed.
	1e) Varying sizes of balls in system.	If new balls are added to old balls, inaccurate pitches may result. Maintain a consistent size of balls.
	1f) Dirt build-up on wheels.	Inspect wheels for steady build-up. Wheels may be cleaned with a rag and acetone, with machine turned off. For heavy build-up, use a 60 grit emery cloth or sand paper.
	1g) Plastic feed chute (tongue) is out of alignment.	Refer to "Servicing Your Equipment" in service manual for adjustment procedure.

IV. PITCHING MACHINE

PROBLEM	CAUSE	SOLUTION
Pitching machine is noisy.	1a) Drive belt on machine is worn or frayed.	Replace “AA-55” drive belt.
	1b) Bearing on idler pulley is bad.	Replace idler pulley.
	1c) Wheel shaft bearing is worn.	Replace wheel shaft bearing.
	1d) Incorrect wheel spacing on machine.	If wheels are too close, a loud “bang” will occur when a ball is pitched. Make shaft spacing adjustment. Refer to "Servicing Your Equipment" in service manual for adjustment procedure.
Pitching machine is vibrating.	1a) Wheels on machine are out of balance (harmonic imbalance).	Adjust speed of machine slightly in one direction or the other. Many times a difference in Rpm's will make a vibration go away. Or interchange top and bottom wheels.
	1b) Drive belt on machine is worn or frayed.	Replace “AA-55” drive belt.
	1c) Wheel wobble.	This occurs when wheels are not mounted properly and causes the wheels to wobble side to side. Remove wheel, flip shaft collar around and make sure all mating surfaces are clean, then remount the wheel. If wobble still exists, interchange or replace wheel.
Machine requires frequent adjustments, for balls that are pitching high/low.	1a) Locking nut on hi/low crank handle is tightened in wrong location.	Refer to "Servicing Your Equipment" in service manual for adjustment procedure.
Main frame on pitching machine is cracking	1a) Improper shaft spacing (too close) on the machine.	Adjust wheel shaft to proper spacing. Refer to "Servicing Your Equipment" in service manual for correct dimensions. If frame is cracked, call ABC for further instructions on how to repair.

TROUBLE SHOOTING GUIDE

V. AUTOMATIC CONVEYOR SYSTEM

Conveyor belt is not moving.	1a) No power at the outlet.	Make sure power cord is plugged in all the way. Check for power at the outlet with a multimeter or by plugging in a drill, radio or other device. If no power is detected check circuit breaker.
	1b) Conveyor motor drive belt has derailed.	Lift up on motor and install drive belt. Check pulley alignment.
	1c) Ball stuck in conveyor.	Dislodge any balls that are stuck in the conveyor, look down inside the bottom end of the conveyor for balls jammed around conveyor belt pulley.
	1d) Damaged power cord.	Check for nicks or cuts in power cord. Repair or replace as needed.
	1e) Damage to male end of power cord.	Remove male end of plug and check for damaged or loose wires.
	1f) Defective conveyor motor.	To verify, check for 115VAC at motor. If voltage is present, replace motor.
	1g) Loose elevator flight bolts catching on top end of conveyor.	Tighten loose elevator flight bolts. NOTE: DO NOT OVER TIGHTEN BOLTS.
	1h) Bad “current sensor”.	Replace “current sensor” or call ABC for verification.
Baseball and/or softball distributing motors are not turning.	2a) Stuck ball in hopper area.	Dislodge any jammed balls.
	2b) Circuit breakers on baseball/ softball hoppers have popped.	Check for any jammed balls, dislodge them, and reset circuit breakers on hoppers.
	2c) Power cord knocked loose by balls.	Check power cord at outlet.
	2d) Damaged power cord.	Check for nicks or cuts on power cord. Repair or replace as needed.
	2e) No power at outlet.	Check circuit breaker in service panel, if okay call ABC for instructions.
	2f) Bad “current sensor”.	Replace “current sensor” or call ABC for verification.
Ball troughs are not filling with balls.	3a) Balls not returning to sump area.	Dislodge balls from back of stalls in pit area and all other areas in batting cage.
	3b) Ball quantity is low.	Add balls to system (add a dozen at a time and watch for results).
	3c) Balls are hung up in various areas.	Check for balls hung up in various areas (i. e. holes in netting, hung up by pitching machine power cords, etc...)
	3d) Foreign object stuck in trough.	Dislodge foreign objects.

MAINTENANCE PROCEDURES

Pages 43 thru 48

DAILY MAINTENANCE, VISUAL INSPECTIONS AND OPERATIONAL PROCEDURES

DAILY CHECKLIST

1. Clean debris from batting area (pit, stalls, etc...)
2. Visually inspect the coin box for damage and repair as necessary.
3. Visually inspect batters stalls for any holes in netting, properly hung back stop pads and well marked batters boxes. Repair if necessary.
4. Walk the inside perimeter of the cage visually checking for ripped netting ties at lower fence, holes in net (including overhead), broken cables, and fencing connections.
5. Visually check pitching machine area (the pit) for netting holes, rips in netting tie downs, etc. Repair if needed.
6. Visually check where balls are pitching through the Netting Holes. Balls must pass through the middle of the holes (not closer to any edge of hole). Make adjustments to net holes as needed. Refer to page 44.
7. Visually check light box warning lights for proper operation. Replace any broken lens or defective light bulbs.
8. Visually check 90 degree drop for proper alignment with ball chute. Check proper spacing between ball drop from 90 degree drop and top of ball chute. Proper spacing is 3.5 inches of drop for baseball and 4.5 inches of drop for softball. Adjust as necessary. Refer to page 42.
9. Visually inspect ball chutes and ball guide chutes for proper alignment.
10. Visually inspect pinch roller wheel for damage or wear. Replace if necessary.
11. Visually inspect pitching wheels for damage or wear. Replace if necessary.
12. Visually check guide chute "micro switch" cord from light box for proper attachment. Be certain that each wire lead has a properly attached crimp-on "fork terminal" and that it is firmly connected to the micro switch leads. Replace "wire ties" that attach micro switch wire to ball guide chute if broken.
13. Manually feed balls through pitching machine and watch carefully for accurate pitches and make adjustments as necessary. Drop a token in each coin box and count the number of pitches to assure micro switch is counting correctly. Check for proper sequencing of light box. Section of Trouble Shooting Guide pages 27-29
14. Turn on hopper/feeding system and observe its operation.
15. Visually check underneath fiberglass shroud at the bottom of the conveyor system before the machines have been turned on for any debris that could block the conveyor.
16. Visually check bats for cracks and worn out grips. Replace as needed.
17. Visually check all batting helmets for cracks or defects. All helmets must have protective face masks attached. Replace helmets/facemasks as needed.
18. Visually check balls for excessive or uneven wear, cracks or breaks. Replace as needed. Remember, never mix old balls with new balls. Replace balls all at one time to assure consistent ball wear.
19. WHENEVER SERVICING OR CONDUCTING INSPECTIONS, ALWAYS KEEP LOOSE CLOTHING A N D LONG HAIR AWAY FROM ANY MOVING PARTS! SERIOUS INJURIES COULD RESULT!
20. See section "Daily Operational Forms & Checklists".

IF YOU HAVE ANY QUESTIONS ABOUT ANY OF THESE INSPECTIONS OR PROCEDURES AFTER REVIEWING AND CHECKING FOR MALFUNCTIONS, CALL "ABC" IMMEDIATELY @ 1-800-578-2243

WEEKLY MAINTENANCE SCHEDULE and OPERATIONAL PROCEDURES

WEEKLY CHECKLIST

1. Wash entire batting cage floor.
2. With pitching machine turned off, remove belt cover and check condition of belt.
3. Check tension of BALL conveyor. Loosen or tighten as needed.

MONTHLY MAINTENANCE SCHEDULE

MONTHLY MAINTENANCE AND OPERATIONAL PROCEDURES

1. Grease pillow blocks at both ends of the conveyor.
2. Lubricate shaft bearings - one pump every month per bearing. DO NOT OVER GREASE- this can reduce the life of the bearing.
3. Clean debris from sump area below fiberglass shroud.
4. Check roof over pitching machines for broken wood, Repair as necessary.
5. Check lighting for all cages.
6. Re-paint batting stall home plate and batters boxes as needed.
7. All batting stall gates must have auto-closing springs. Check them for proper tension (If your gates do not have auto-closing springs, install them). Check for gaps in gates where balls could escape and adjust as necessary.
8. Clean dust off pitching machine motors.

IF YOU HAVE ANY QUESTIONS ABOUT ANY OF THESE INSPECTIONS OR PROCEDURES AFTER REVIEWING AND CHECKING FOR MALFUNCTIONS, CALL "ABC" IMMEDIATELY @ 1-800-578-2243

MAINTENANCE SCHEDULE

NOTE: Use *Multi-Purpose Lithium Grease* when lubricating equipment.

PITCHING MACHINE	Daily	Weekly	2 Weeks	Monthly	3 Months	6 Months	As Needed
SHAFT BEARING - LUBRICATION (1 PUMP)				√			
CRANK HANDLE - LUBRICATION				√			
SHAFT BEARING SET SCREWS				√			
PITCHING ACCURACY	√						√
WHEEL WEAR		√					
WHEEL CLEANING			√				
DRIVE BELT INSPECTION		√					
MOTOR INTAKE VENT CLEANING (ONLY ON "OPEN DRIP PROOF MOTORS")				√			
CHECK 90 DEGREE DROP ADJUSTMENT WITH BALL CHUTE	√						

CONVEYOR SYSTEM	Daily	Weekly	2 Weeks	Monthly	3 Months	6 Months	As Needed
PULLEY BEARINGS - LUBE (1-2 PUMPS)						√	
CONVEYOR BELT TENSION							√
POWER CORD INSPECTION		√					
90 DEGREE DROP ALIGNMENT	√						
PINCH ROLLER WHEEL ADJUSTMENT		√					
PINCH ROLLER WHEEL SET SCREW			√				
PINCH ROLLER ELECTRICAL CONNECTIONS	√						

LIGHT BOX	Daily	Weekly	2 Weeks	Monthly	3 Months	6 Months	As Needed
BROKEN RED/AMBER LENSES	√						
LIGHT BULBS	√						
POWER CORDS		√					
ELECTRICAL CONNECTIONS		√					
CIRCUIT BOARD MOUNTING SCREWS				√			
DOOR CLAMPS							√

NETTING	Daily	Weekly	2 Weeks	Monthly	2 Months	6 Months	As Needed
CABLE - ADJUSTMENTS							√
HOLE REPAIR							√
NET SLACK (FROM STRETCHING)							√
BALL EXIT HOLE ALIGNMENT	√						

GENERAL	Daily	Weekly	2 Weeks	Monthly	2 Months	6 Months	As Needed
BATTERS BOX & HOMEPLATE				√			
SELF CLOSING GATE DOORS	√						
WARNING SIGN CONDITION		√					
CHECK BATS CONDITION	√						
CHECK BALL CONDITION	√						

COIN BOX	Daily	Weekly	2 Weeks	Monthly	3 Months	6 Months	As Needed
TOKEN INSERT CLEANING				√			
ELECTRICAL CONNECTIONS		√					

Classification of part orders
All part orders classified into two groups

WARRANTY

MEMO INVOICE

* For parts with return value customer required to return defective parts within 30 days or invoice becomes payable in full.

N/C

for parts with no return value. Service Personnel will advise.

NON - WARRANTY

STANDARD BILLING

Net 30, C.O.D., etc..

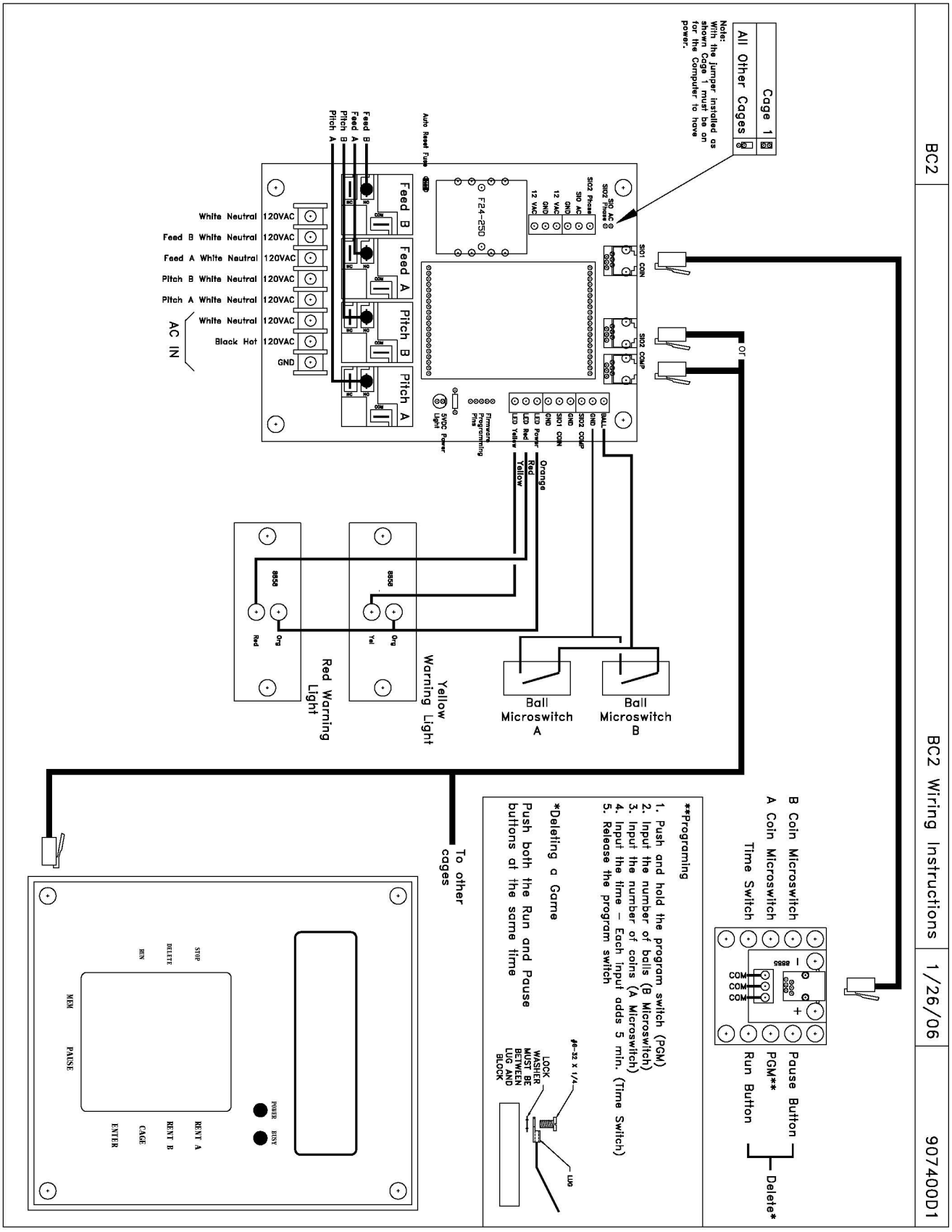
N/C

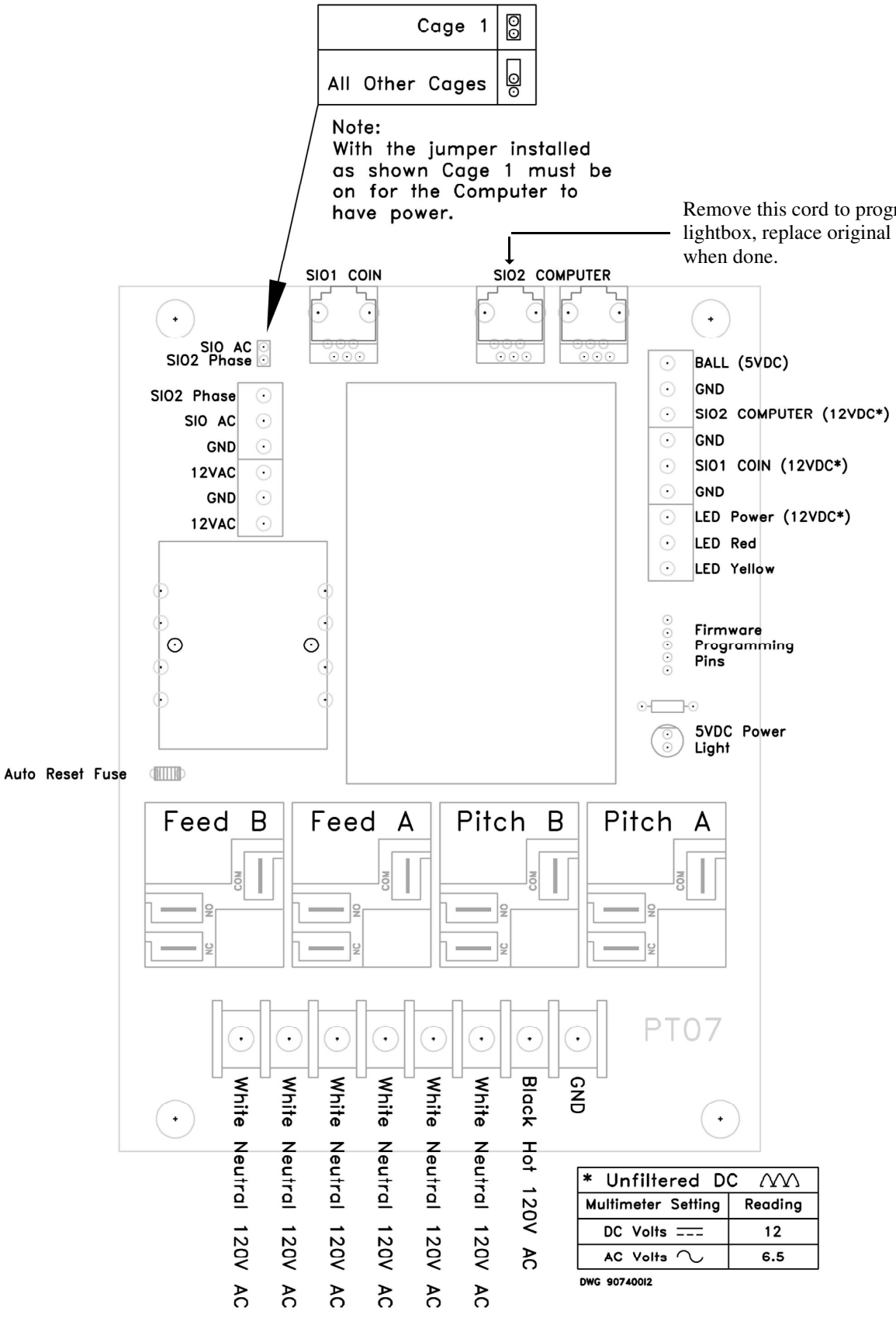
for orders of small value. Sales Personnel will advise.

***** - All parts not returned within 30 days are subject to charges.

SERVICING YOUR EQUIPMENT

Pages 49 thru 63


BC2
BC2 Wiring Instructions
1/26/06
907400D1
Cage 1
All Other Cages
Note: With the jumper installed as shown Cage 1 must be on for the Computer to have power.
White Neutral 120VAC
Feed B White Neutral 120VAC
Feed A White Neutral 120VAC
Pitch B White Neutral 120VAC
Pitch A White Neutral 120VAC
White Neutral 120VAC
Black Hot 120VAC
GND
AC IN
Feed B
Feed A
Pitch B
Pitch A
F24-250
SW1 COIN
SW2 COMP
or
Ball Microswitch A
Ball Microswitch B
Red Warning Light
Yellow Warning Light
Orange
Red
Yellow
B Coin Microswitch
A Coin Microswitch
Time Switch
Pause Button
PGM**
Run Button
Delete*
**Programing
1. Push and hold the program switch (PGM)
2. Input the number of balls (B Microswitch)
3. Input the number of coins (A Microswitch)
4. Input the time – Each input adds 5 min. (Time Switch)
5. Release the program switch
*Deleting a Game
Push both the Run and Pause buttons at the same time
#6-32 x 1/4
LOCK WASHER MUST BE BETWEEN LUG AND BLOCK
LUG
To other cages
STOP
DELETE
RUN
MEM
PAUSE
POWER
BUSY
RENT A
RENT B
CAGE
ENTER



* Unfiltered DC ⩘	
Multimeter Setting	Reading
DC Volts ⎓	12
AC Volts ~	6.5

DWG 90740012

EQUIPMENT ADJUSTMENTS

PITCHING MACHINES

IMPORTANT NOTE: ACCURACY OF THE PITCHING MACHINE SHOULD BE CHECKED EVERY DAY BEFORE OPENING AND PERIODICALLY THROUGHOUT THE DAY. ALL ADJUSTMENTS MUST BE MADE WHILE THE HITTING STALL IS VACANT OF EMPLOYEES OR CUSTOMERS. VERIFY THAT THE BALL IS CONSISTENTLY PITCHING OVER HOME PLATE BEFORE ALLOWING ANY CUSTOMERS TO ENTER THE HITTING STALL. (WHILE SERVICING OR ADJUSTING EQUIPMENT ALWAYS KEEP LOOSE CLOTHING AND LONG HAIR AWAY FROM ALL MOVING PARTS! SERIOUS INJURIES COULD RESULT)

BALL VELOCITY ADJUSTMENT

The speed of the ball is increased or decreased by adjusting the "AC Speed Controller". This is accomplished by turning the "AC Speed Controller knob" in the appropriate direction. Standing behind the machine, a clockwise rotation of the knob will increase velocity, while a counterclockwise rotation will decrease velocity. The trajectory (High/Low) of the pitch and Right/Left adjustment will need to be checked and/or re-adjusted after any speed change. For exact MPH of pitches a hand held radar gun would be required.

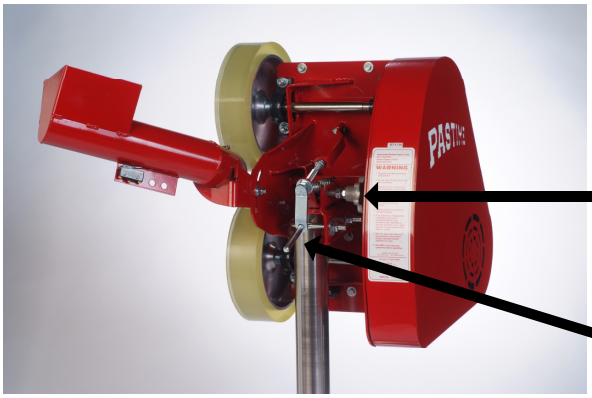
HIGH/LOW ADJUSTMENT

The pitching height may be raised or lowered by turning the "High/Low Crank Handle" (part # 082) in the appropriate direction, see page 52. A clockwise rotation will raise the pitch, while a counterclockwise rotation will lower the pitch. To make a trajectory adjustment, loosen the "High/Low Crank Jam Nut", and turn the handle in the desired direction. When the adjustment has been completed, tighten the "High/Low Crank Jam Nut" against the machine mounting bracket (towards the crank handle). Elevation Control System adjustments are done by pushing the Up or Down buttons located in the batting stall at the hi/low box.

RIGHT/LEFT ADJUSTMENT

Pitches may be adjusted right or left by two methods. For minimal adjustments, use the "Right/Left Adjust Knob" located on the post mount assembly. To make an adjustment, loosen the R/L Adjust Knob Jam Nut" and turn the knob in the appropriate direction, see page 52. When the adjustment has been completed, tighten the "R/L Adjust Jam Nut" to secure in position. For large right or left adjustments, turn knob until post mount assembly is positioned approximately halfway of it's travel. Loosen nuts on U-Bolt and re-position entire machine so that balls are passing over the center of home plate. Tighten U-Bolt by alternating back and forth between the two nuts, equally tightening each nut until secure. Once U-Bolt is tight, check pitch and fine tune using the "Right/Left Adjust Knob". Be sure to tighten jam nut when adjustment is complete.

Pastime Baseball Pitching Machine
with manual height adjustment



Pastime Baseball Pitching Machine
with Elevation Motor Assembly

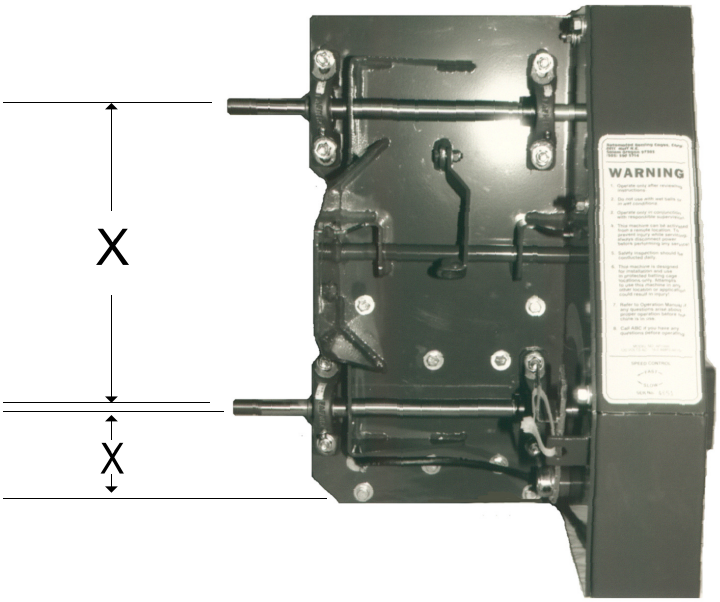
* AC Speed Controller is installed on all versions of *Pastime* machines

WHEEL SHAFT ADJUSTMENTS

BASEBALL/SOFTBALL DIMENSIONS

X = Center of shaft to center of shaft Softball Fastpitch = 14” Baseball Slow/Medium/Fast = 13” Baseball Very Fast = 12-7/8”
Y = Edge of shaft to edge of frame Baseball = 4-1/2” Softball = 3-7/8”

NOTE: “Y” dimensions must be equal to insure shaft is parallel with frame.



VAS & SAS BEARING INSTALLATION

SELF-LOCKING COLLAR DIRECTIONS

Most pillow block units are equipped with the self-locking collar to facilitate the mounting of wide inner ring bearings. This self-locking collar eliminates the need for locknuts, washers, sleeves and adapters.

The locking collar has a counter bored recess which is made purposely eccentric with the bore. The collar recess and the end of the bearing inner ring with which it engages are both machined so that they act as mating cams when on the shaft.

When the collar is engaged to the inner ring, it grips the shaft tightly with a positive binding action that increases with use. No adjustments of any kind are necessary.

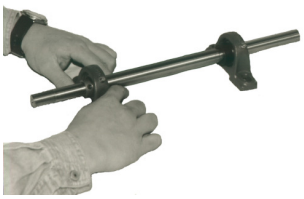
1) Slip the shaft through the pillow block unit when incorporates the wide inner ring bearing. Be certain the bearing is aligned in position along the shaft to eliminate any possibility of cramping loads. Refer to dia. #1

2) Fasten the unit securely to the base using the proper bolt size specified in the catalog. Refer to dia. #2

3) Place the self-locking collar on the shaft with its cam adjacent to the cam on the end of the bearings inner ring. Turn the collar in the direction of shaft rotation. The eccentric recessed cam will slide over and engage the corresponding cam on the bearing inner ring. Refer to dia. #3

4) Using a lightweight hammer and drift pin inserted in the drift pin hole, strike in the direction of shaft rotation to positively engage the collar. The wide inner ring is now locked to the shaft. Refer to dia. #4

5) As a final step, fully tighten the set screw. It exerts a wedging action to hold the collar always in the engaged position, even under shock load. This fafnir design will operate effectively after the cams are tightly locked in most cases with no setscrew at all. Refer to dia. #5



DIA. #1

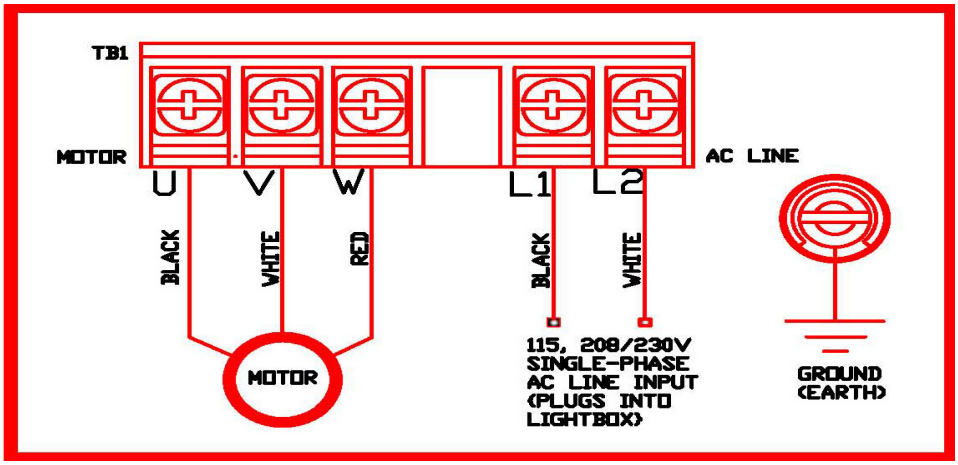
DIA. #3

DIA. #5

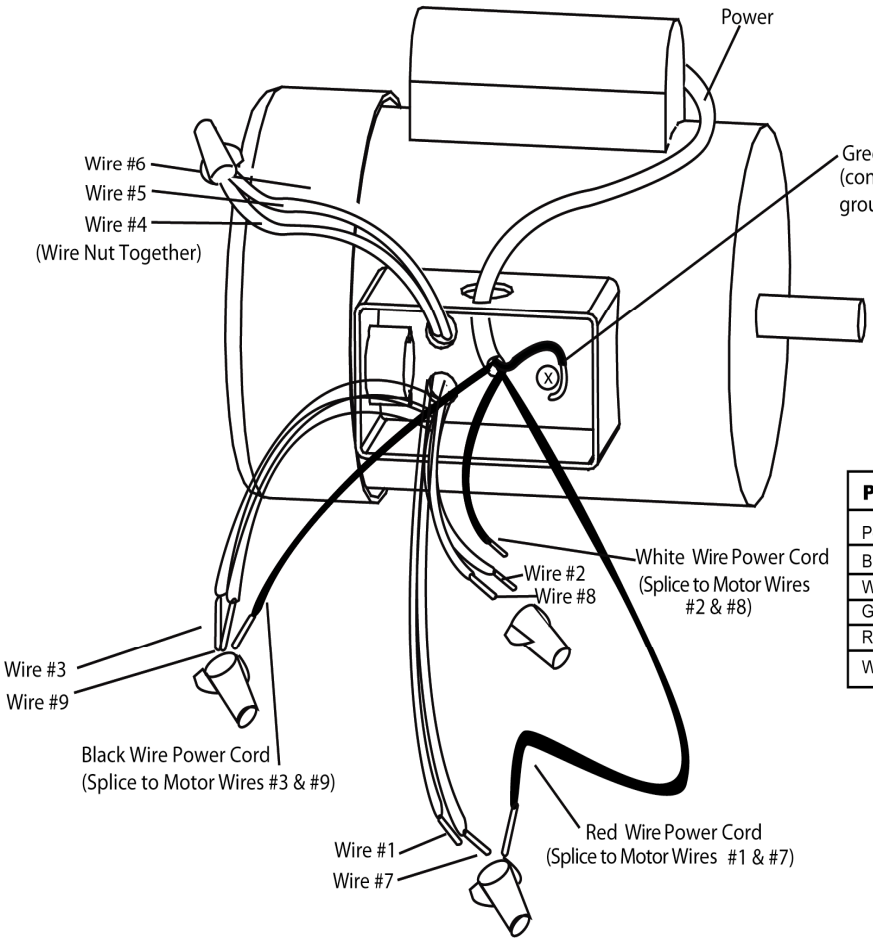
DIA. #2

DIA. #4

AC SPEED CONTROLLER & 3 PHASE MOTOR WIRING DIAGRAM



3 PHASE US MOTOR MODEL #F016 WIRING DIAGRAM



Pitching Motor Wiring Diagram			
Power Cord	Motor Wires	Motor Wires	Motor Wires
Black Wire	3	9	
White Wire	2	8	
Green Wire	Ground Screw		
Red Wire	1	7	
Wire Nut	6	5	4

BATTING CAGE WINTERIZATION

GRAVITY FLOW DRAIN SYSTEM

1) Turn power off leading to A/R Conveyor System and pitching machines.

2) Place plastic bag over pitching machine, light boxes and coin boxes, ventilate bottom of bags.

3) Remove fiberglass shroud then disconnect conveyor from hopper and place in area away from rain, snow, sleet etc...

4) Netting System: The safest method to protect your net and pipe structure would be to un-tie the rope lanyards at every perimeter pole and let the net hang straight down from the net collar. Another method that would give you a comfortable degree of safety and saves you the job of pulling the net back up in the spring is as follows.

a) Tie a piece of net twine to the metal ring in the net, then tie it off to the horizontal rail.

b) Un-tie rope lanyards from perimeter vertical pipe, leaving un-tied end of rope resting on the canopy net.

This will hold the net in place, yet the single strand of twine would break loose under a heavy load. Upon opening in the spring you would need to re-tie the rope lanyards to the vertical pipes.

5) Unplug Micro-Processor power cord from outlet and remove all processor cards located in the middle of Micro-Processor Box, then place cards in a safe area.

ELECTRIC POWERED SUMP PUMP DRAIN SYSTEM

1) Place plastic bag over all pitching machines, then ventilate the bottom of each bag.

2) Remove light boxes and place in a covered area away from direct weather. Cover up any bare wiring and place away from flooding levels.

3) Remove fiberglass shroud then disconnect conveyor from hopper and place in area away from rain, snow, sleet, etc...

4) Netting System: Refer to #4 of “gravity flow drain system”.

5) Unplug Micro-Processor power cord from outlet and remove all processor cards located in the middle of Micro-Processor Box, then place cards in a safe place.

NOTE: If you have any questions before winterizing please call ABC’s Customer Service Department for questions.

CURRENT SENSOR INSTALLATION DIRECTIONS

WARNING! DISCONNECT POWER FROM SUB PANEL BEFORE BEGINNING.

1) After verifying that power has been turned off at the sub panel, remove the two or three main feed lines from terminal blocks. Slip the main lines through the holes in the Current Sensor and re-connect to terminal blocks. (Make sure current sensor "switching circuit" and "power feed" screws are in the location as shown in diagram below).

2) Mount Mercury Displacement Relay in the back or on the side of the sub panel. (Must be installed vertically as shown in diagram below).

3) Remove the wire from the circuit breaker that powers the conveyor outlet and connect it to the top lug of the Mercury Displacement Relay.

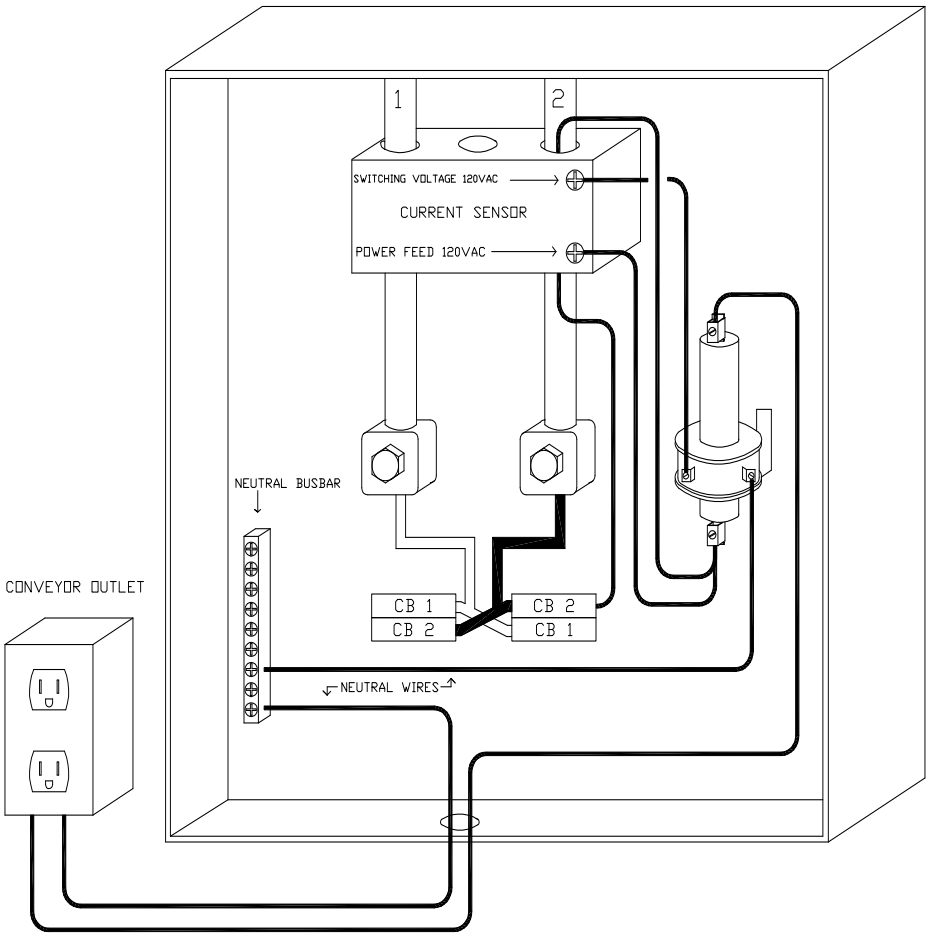
4) Install 18 GA wire from the current sensor "power feed" screw to the Mercury Displacement Relay bottom lug.

5) Install 12 GA wire from the conveyor circuit breaker through the current sensor and connect to the Mercury Displacement Relay bottom lug. **NOTE**: Wire must be run through current sensor hole on the same leg as the conveyor circuit breaker. (See diagram below for proper way to route the wire).

6) Install 18 GA wire from the neutral strip to the Mercury Displacement Relay (east) lug.

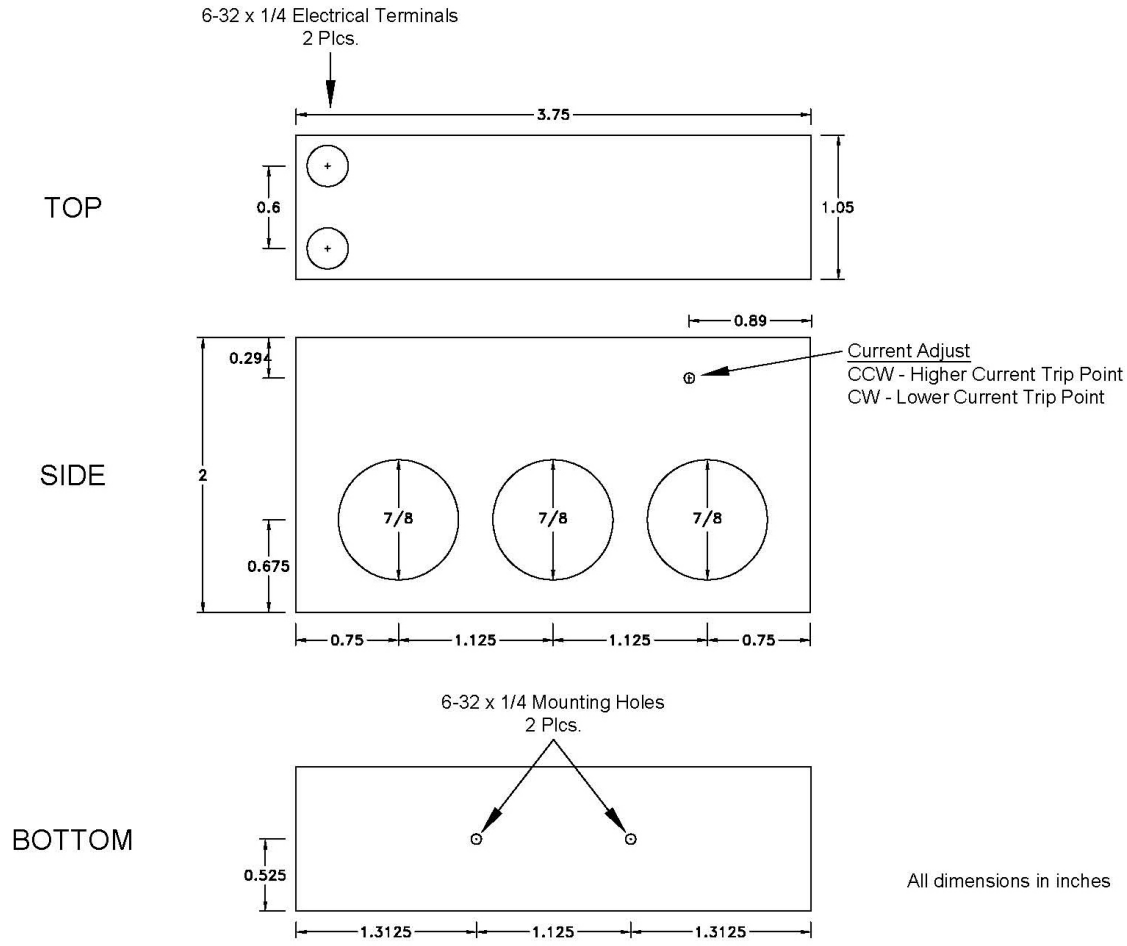
7) Install 18 GA wire from the current sensor "switching circuit" screw to the Mercury Displacement Relay (west) lug.

NOTE: If your sub panel main lines have any other hot lines besides the pitching machine outlets and conveyor outlets going through the current sensor (such as sump pump, lights, etc...) this could result in the conveyor and hoppers running continuously. To correct this problem you must cancel out the circuit (See step 5 for proper way to cancel out the circuit). If you have any further questions contact ABC's Service Department.



CURRENT SENSOR ADJUSTMENT

110 VAC goes from low impedance to high impedance on trip.
Max. Load 3 AMP at 110 VAC



CONVERTING SOFTBALL SLOW PITCH TO SOFTBALL FAST PITCH

The Fastpitch Softball Chute and its accessories were inspected before shipping and should be in good condition when you receive them. If shipping damages exists, immediately notify the carrier and the ABC Customer Service Department at 1-800-578-2243

If you need to return the part to the factory:

- Send back defective part attention to Customer Service Department
- Attach a card with your company's name, address, person to contact and phone number.
- Provide a short written description of the damage.

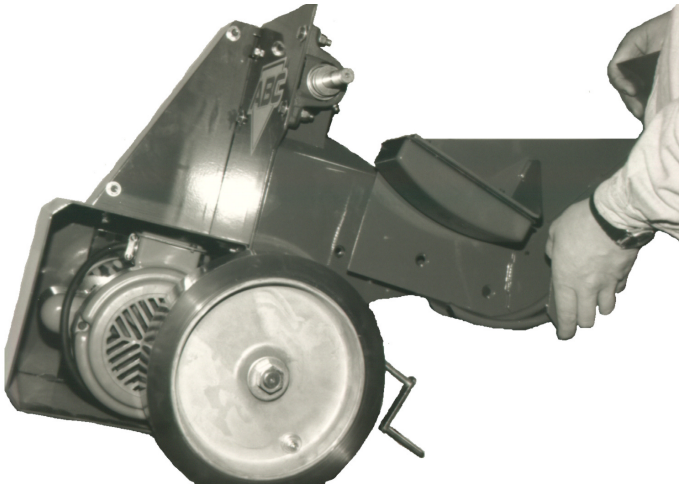
REMOVING SLOW PITCH SOFTBALL CHUTE

1) Get a screwdriver and remove the white and black wires from the Ball Count Microswitch located on your existing slow pitch softball chute, refer to figure 1a.

2) With an allen wrench and a 9/16" box end wrench. Remove the slow pitch chute as shown in figure 1b.

Fig. 1a

Fig. 1b



APPLICATION OF FAST PITCH SOFTBALL CHUTE

1) Slide the shaft collar (#12) on to the top shaft all the way over until it touches the bearing, next put the pitching wheel (#010) on in the same manor that you mounted the shaft collar. Finally place the 3/4" flat washer, lock washer and nut on to the top shaft and tighten them down using a adjustable crescent wrench. Refer to figure 2a.

2) Attach the fast pitch softball chute to the same area you removed the slow pitch chute, using the existing nut & bolts. Refer to figure 2b

3) Re-attach the ball count microswitch wires, placing the black wire on normally open (NO) and the white wire on common (COM).

4) To adjust the accuracy and speed of your new fast pitch softball machine, refer to the Equipment Adjustments section, page no. 45 of your Owners Manual.

Fig. 2a

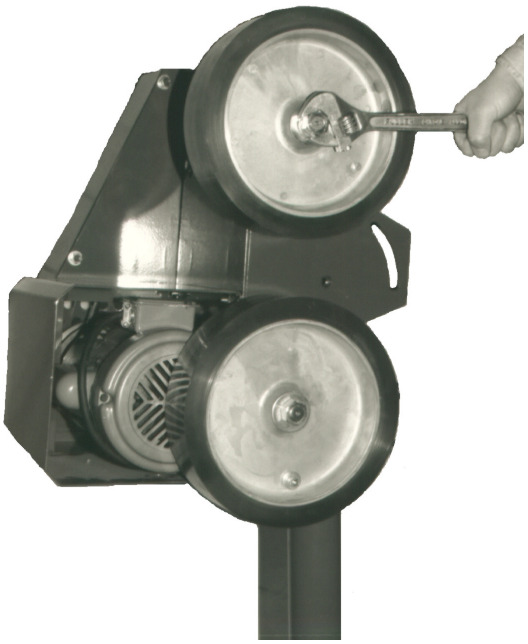
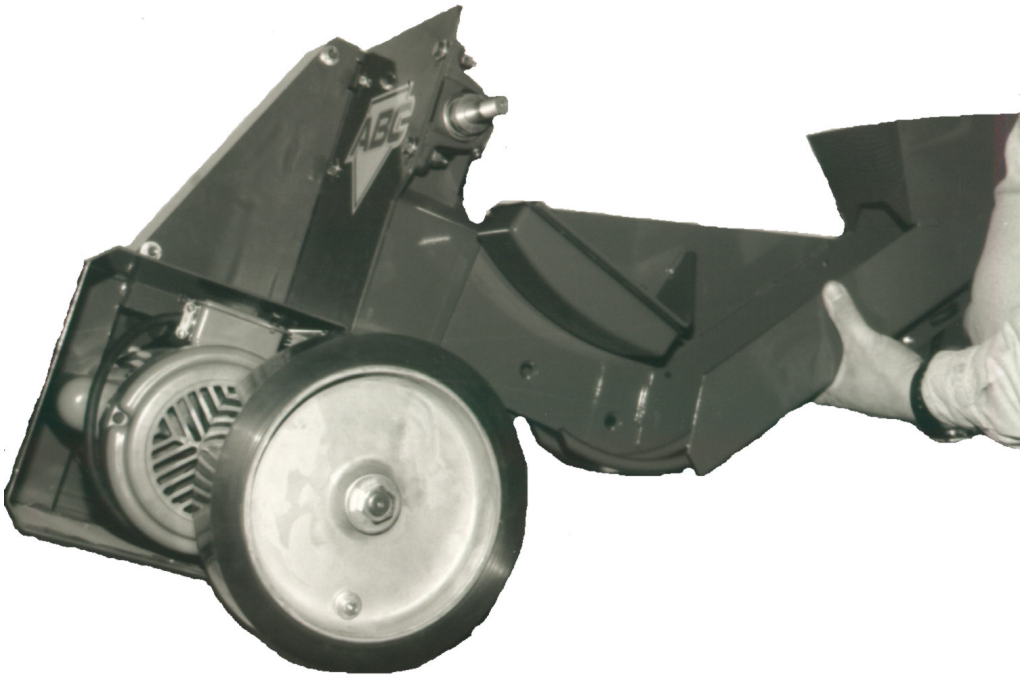


Fig. 2b



IMPORTANT NOTE:

It is common that after a rain storm or on a humid day your front machine net will sag, when this happens the net ring will lower, ultimately obstructing the flight of the ball. It is recommended that anytime this happens you immediately shut down that cage and re-adjust the net ring.

ADJUSTING NET RING

WARNING! Before any adjustment is made, make sure that nobody is batting in any of the cages. ABC recommends that you adjust the net rings in the morning before you open to the public, or after you close. Keep loose clothing and long away from all moving parts.

1) With a game activated and pitching, stand behind the machine and watch the flight of the ball to determine were it is hitting the net ring. After you have verified were the ball is hitting the ring, un-plug the light box power cord from the receptacle and mark the spot were the ball is hitting with a piece of tape.

2) For this step you will need 20 ft. of 1/4" nylon rope cut at 5 ft. lengths. With the four lengths of rope in your hand, position yourself in front of the pit net facing the pitching machines. Take one rope at a time and attach them as shown in figure 1a.

3) Now that the net ring is secured in place, it's time to adjust the ring directly in the center of the balls flight path. Locate the area on the ring were you marked it with tape. Using figure 1b. as an example, un-tie the rope in the area marked with tape and pull the rope until the center of the ring is directly in the middle of the balls flight path. **WARNING:** Before you allow anyone to hit in the cage , it's important that you pitch a round of balls through the ring to verify that the ball is flying directly through the center. **NOTE:** It might take 2 or 3 adjustments to center the ring.

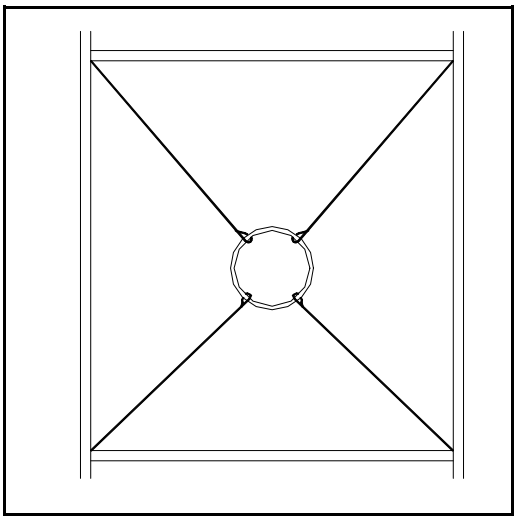


Figure 1a.

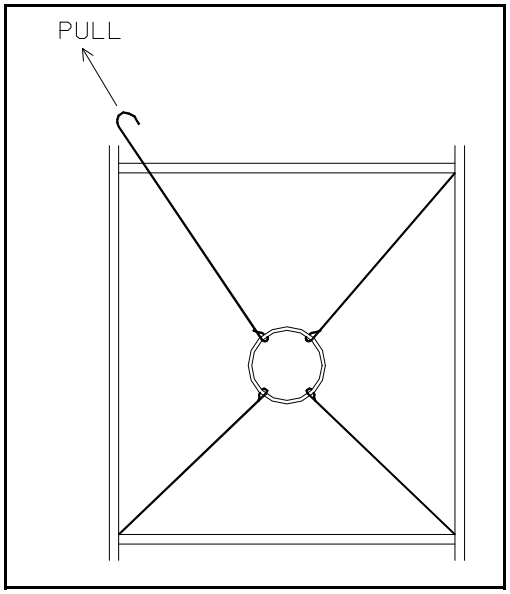


Figure 1b.

DAILY OPERATIONAL FORMS & CHECKLISTS

Pages 64 thru 73

CHECK	DAILY CHECKLIST DATE_____/_____/_____	INSPECTED BY:
	Clean debris from batting area (pit, stalls, etc…)	
	Visually inspect the coin box for damage and repair as necessary.	
	Visually inspect batters stalls for any holes in netting, properly hung backstop pads, well marked batters boxes, verify gates have return springs attached and that the gates fully close. Repair if necessary.	
	Walk the inside perimeter of the cage visually checking for ripped netting ties at lower fence, holes in net (including overhead), broken cables, and fencing connections.	
	Visually check pitching machine area (the pit) for netting holes, rips in netting tie downs, etc. Repair if needed.	
	Visually check where balls are pitching through the Netting Holes. Balls must pass through the middle of the holes (not closer to any edge of hole). Make adjustments to net holes as needed. Refer to page 44.	
	Visually check light box warning lights for proper operation. Replace any broken lens or defective light bulbs.	
	Visually check 90 degree drop for proper alignment with ball chute. Check proper spacing between ball drop from 90 degree drop and top of ball chute. Proper spacing is 3.5 inches of drop for baseball and 4.5 inches of drop for softball. Adjust as necessary. Refer to page 42.	
	Visually inspect ball chutes and ball guide chutes for proper alignment.	
	Visually inspect pinch roller wheel for damage or wear. Replace if necessary.	
	Visually inspect pitching wheels for damage or wear. Replace if necessary.	
	Visually check guide chute "micro switch" cord from light box for proper attachment. Be certain that each wire lead has a properly attached crimp-on "fork terminal" and that it is firmly connected to the micro switch leads. Replace "wire ties" that attach micro switch wire to ball guide chute if broken.	
	Manually feed balls through pitching machine and watch carefully for accurate pitches and make adjustments as necessary. Drop a token in each coin box and count the number of pitches to assure micro switch is counting correctly. Check for proper sequencing of light box. Section of Trouble Shooting Guide pages 27-29	
	Turn on hopper/feeding system and observe its operation.	
	Visually check underneath fiberglass shroud at the bottom of the conveyor system before the machines have been turned on for any debris that could block the conveyor.	
	Visually check bats for cracks and worn out grips. Replace as needed.	
	Visually check all batting helmets for cracks or defects. All helmets must have protective face masks attached.Replace helmets/facemasks as needed.	
	Visually check balls for excessive or uneven wear, cracks or breaks. Replace as needed. Remember, never mix old balls with new balls. Replace balls all at one time to assure consistent ball wear.	

BATTING RANGE DAILY REPORT

DAY SUPER:	DATE:
NIGHT SUPER:	DATE:
TIME IN: TIME IN:	TIME OUT: TIME OUT:

MICROPROCESSOR READINGS

CAGE NO.	CLOSING DISPLAY READINGS	OPENING DISPLAY READINGS	TOTAL PLAYS
1			
2			
3			
4			
5			
6			
7			
8			
9			
RENTAL TIME	**CLOSING RENTAL READINGS**	**OPENING RENTAL READINGS**	**TOTAL PLAYS**
15 min.			
30 min.			
45 min.			
60 min.			
90 min.			
50 balls			
100 balls			
150 balls			
250 balls			
Manl.			
BILL CHANGER	**CLOSING READINGS**	**OPENING READINGS**	**TOTAL AMOUNT**
$ 1.00			
$ 5.00			
$10.00			
$20.00			

WEATHER INFORMATION
APPROX. HIGH:
APPROX. LOW:
COMMENTS:

COUPONS / FREE GAME
1 -FREE TOKEN:
2 - FREE TOKENS:
5 - FREE TOKENS:
GIFT CERTIFICATE:

DECK DUTIES CHECKLIST **DATE:**

TIMES	Check all Gabage Cans	Check Parking Lot	Litter & Light Patrol on Mini Golf	Inspect Pit Area	Check Loose Wire, Balls etc...	Arcade Inspection	Check Restrooms	Inspected By:
10:00am								
10:30am								
11:00am								
11:30am								
12:00pm								
12:30pm								
1:00pm								
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12:00pm								

DAILY OPENING DUTIES

DUTIES	ASSIGNED TO	CHECK OFF	SUPERVISOR GRADE
SWEEP - Golf courses, (all trash and cigarette butts) Proshop areas, deck area, parking lot, breezeway and ice cream area.			
LITTER PATROL - Entire facility			
PUT UMBRELLAS UP			
SET-UP PITCHING MACHINES			
CHECK NETTING & REPAIR HOLES			
CHECK CONVEYOR & SHROUD SO NOTHING IS BLOCKING CONVEYOR			
CHECK HOPPERS TO MAKE SURE THERE ARE NO FOREIGN OBJECTS IN IT			
MAKE SURE CORDS ON PITCHING MACHINES DON'T BLOCK BALLS COMING DOWN			
CHECK WIRE TIES ON ALL CORDS COMING FROM LIGHT BOXES			
CHECK WHEELS ON PITCHING MACHINES			
CHECK RESTROOMS SUPPLIES			
MAKE SURE THERE ARE ENOUGH BATTING TOKENS IN PROSHOP			

SERVICE DEPARTMENT BATTING CAGE CHECKLIST

LOCATION:	MECHANICS:	DATE:
MANAGER ON DUTY:	EVALUATOR:	TIME:

CAGES MUST BE MAINTAINED PER CAGE SERVICE MANUAL
PLEASE BE SPECIFIC ABOUT DEFICIENT AREAS

SAFETY

CAGE DOORS:	**ALL NETTING**
BACK MAT:	**BATTER'S BOX:**

GENERAL CONDITION

PLEASE USE THE LETTER THAT CORRESPONDS WITH THE DEFICIENT AREAS. A. WHEELS B. BELTS C. GUIDE CHUTE D. FEED TUBE ALIGNMENT E. HOPPER ASSEMBLY F. AIM OF BALL G. PINCH ROLLER H. WIRING I. BEARING J. AMBER/RED WARNING LIGHTS K. CAGE LIGHTING	BALL CONDITION & QUANTITY COIN BOXES CLEANLINESS OF CAGES

PITCHING MACHINE

#1	**#6**
#2	**#7**
#3	**#8**
#4	**#9**
#5	**MISC.**

TEAM RENTAL INFORMATION

DATE:	**TIME:**
TEAM NAME:	**COACHES NAME:** **PHONE NUMBER:**
TYPE OF MACHINE:	**SPEED OF MACHINE:**

TIME	BASEBALL	SOFTBALL	VIDEO TAPE
9:00 9:30			
10:00 10:30			
11:00 11:30			
12:00 12:30			
1:00 1:30			
2:00 2:30			
3:00 3:30			
4:00 4:30			
5:00 5:30			
6:00 6:30			
7:00 7:30			
8:00 8:30			
9:00 9:30			
10:00 10:30			

COMMENTS:

TEAM RENTAL INFORMATION	
TEAM NAME:	CLASS:
CITY OF LEAGUE:	BASEBALL: SOFTBALL:
AGE GROUP:	YEARS TOGETHER:
HEAD COACH:	PHONE #:
ADDRESS:	CITY: ZIP:
ASSISTANT COACH:	PHONE #:
ADDRESS:	CITY: ZIP:
START OF LEAGUE:	END OF LEAGUE:

DATE/TIME 15 MIN. RENTAL	DATE/TIME 1/2 HR. RENTAL	DATE/TIME 1 HR. RENTAL

COMMENTS:

PROSHOP DAILY REPORT

DAY SUPER:	DATE:
NIGHT SUPER:	DATE:

TOTAL TRANSACTION	CASH TRANSACTION	CREDIT TRANSACTION	SALE TAX RECONCILIATION	TODAY'S TOTAL RECEIPTS
Ending Invoice #: Starting Invoice #: # of Voided Invoices:	Ending Cash: Starting Cash: Today's Cash Receipts:	No. of Transactions: Today's Total Credit Receipts:	Total Proshop Receipts: 7% x above Total: Difference = Total of Sales Tax on all Invoices:	Cash Receipts: Credit Transactions: Receivables paid today: Today's Total Receipts:

RETURNS

INV. #	MODEL # DESRIPT. OF ITEM	REASON FOR RETURN	MODE OF REFUND	SIG. OF SUPERVISOR

RECEIVABLES RECEIVED TODAY

INVOICE #	DATE OF INVOICE	AMOUNT PAID	BALANCE DUE

BE SURE TO MAKE APPROPRIATE INVENTORY ADJUSTMENTS

CASH REFUNDS: Note below if any money had to be drawn from another source other than Proshop cash drawer.

DEFECTIVE EQUIPMENT RETURNS

INVOICE #	MODEL # & DESCRIPT. OF ITEM	DEFECTIVE PART	EQUIPMENT REPLACED	RECEIPT GIVEN PENDING MANU-FACT.	BILL DUE

BE SURE TO MAKE INVENTORY ADJUSTMENTS IF EQUIPMENT IS REPLACED.

HOUSE CHARGES TODAY

INVOICE #	TOTAL INVOICE AMOUNT	DOWN PAYMENT IF ANY	BALANCE DUE	NAME OF CUSTOMER OR ACCOUNT

Do not include any partial payments. Any partial payments should be put into envelope with account name on it. Keep envelope in appropriate area of safe until account has been paid in full. On the day the account is paid in full, credit the receivables section of that days report.

FAX YOUR ORDER

CHECK ONE ONLY

UPS REGULAR	UPS 3RD DAY	UPS BLUE	UPS RED	UPS RED SATURDAY

QUANTITY	PART NUMBER	DESCRIPTION

SOLD TO:
NAME:
PHONE #:
P.O. #:

SHIP TO:
NAME:
PHONE #:
P.O. #:

SPECIAL INSTRUCTIONS:

OPERATION OF BALL DRYERS

Pages 74 thru 77

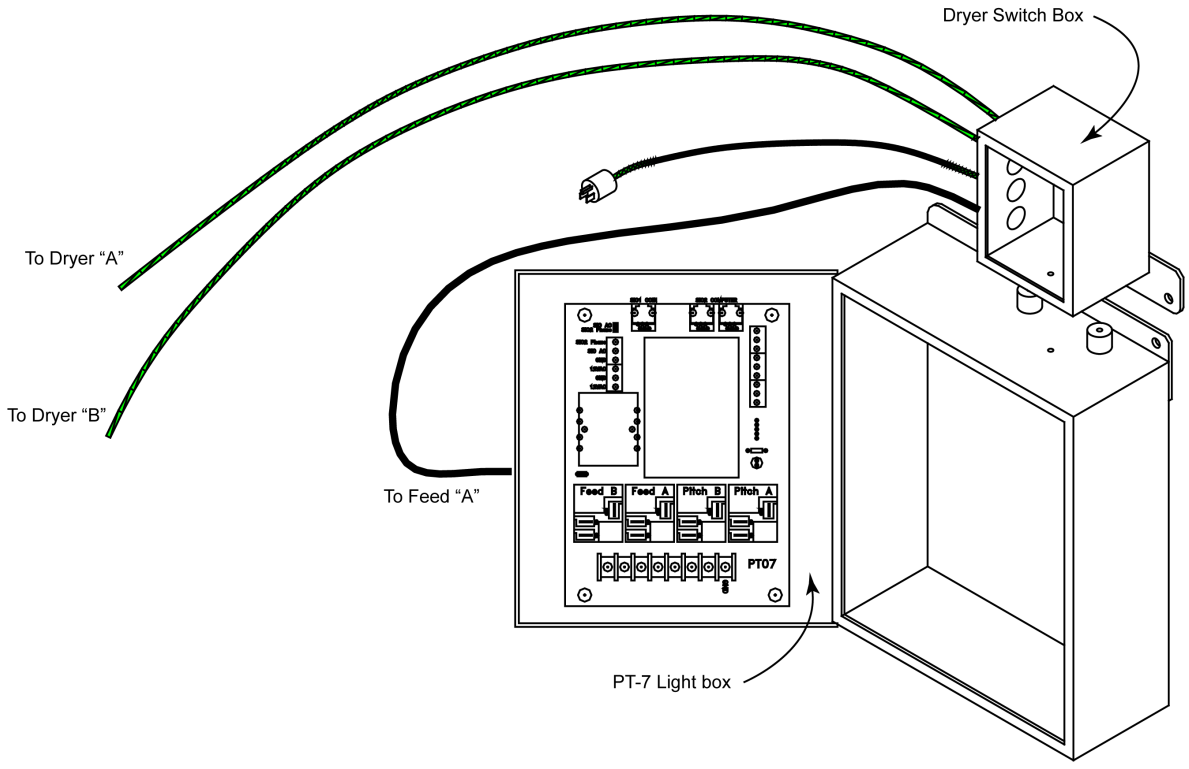
AUTOMATIC BALL DRYING SYSTEM

Ball Drying Single/Dual Switching System. This system when plugged in allows the ball dryers to automatically turn on & off with the pinch roller motors. If you have purchased the Dual Switching System, you may operate a ball dryer on both machines of a dual system. Since the switching will allow only one system at a time to run, one 20amp electrical circuit can be used for both dryers. By switching the systems on & off, the balls are effectively dried, excessive heating is eliminated and you will experience an energy savings.

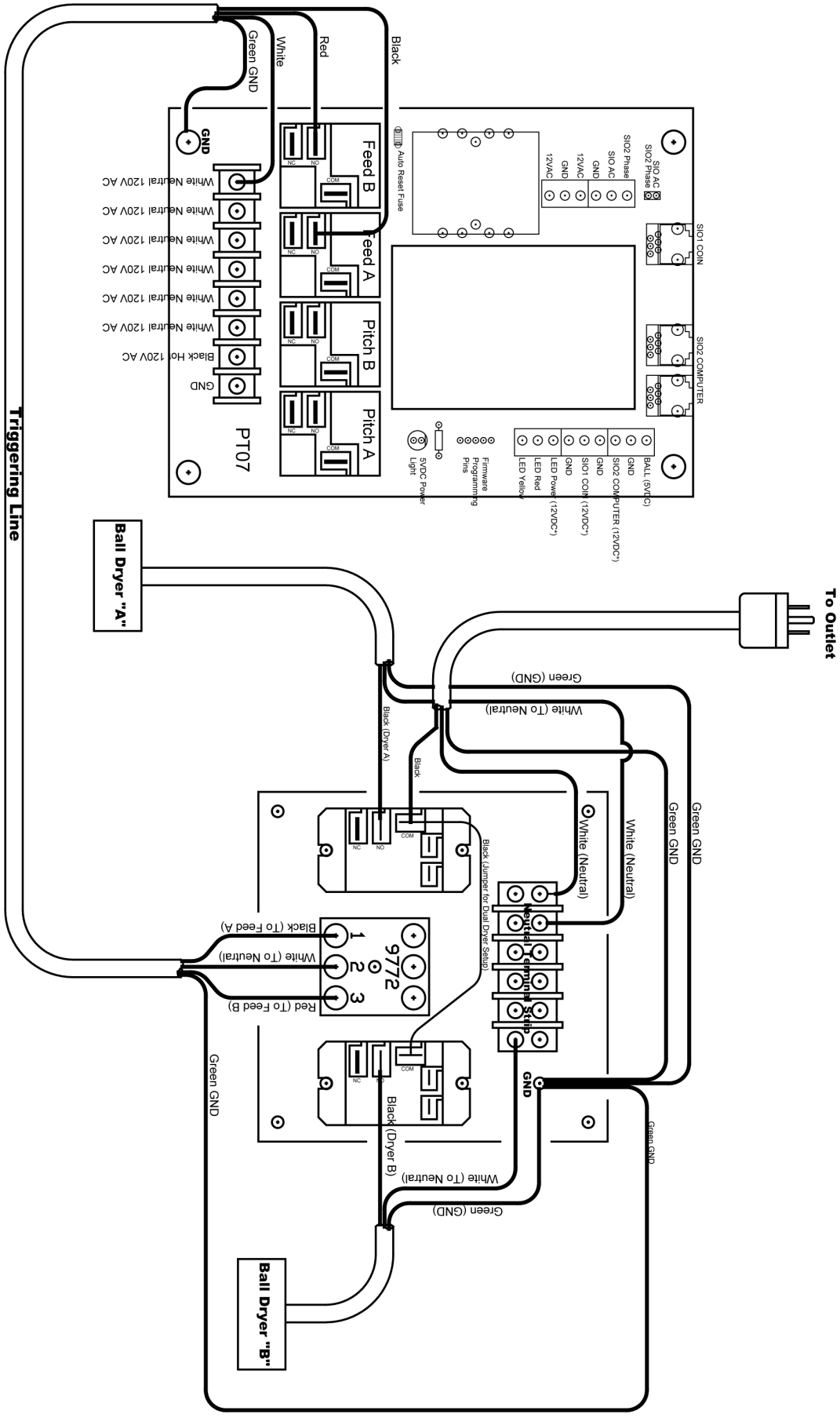
SAFETY INFORMATION

For your safety and the safety of others, pay special attention to these precautions.

- Equipment maintenance should only be performed by qualified persons with a full understanding of the equipment and how it operates. It is also very important that the person maintaining the equipment understands about the batting range operation and risks involved with repairing and maintaining the system.
- **CAUTION:** disconnect power cord from electrical outlet *BEFORE* servicing warning light box.
- Always wear protective eyewear.
- Only work on light box before operating hours.
- Do not remove any guards, labels, shields, covers or safety devices; they are installed for your safety.
- Before reconnecting power cord, make sure that all electrical connections are properly secured.



BALL DRYER WIRING SCHEMATIC



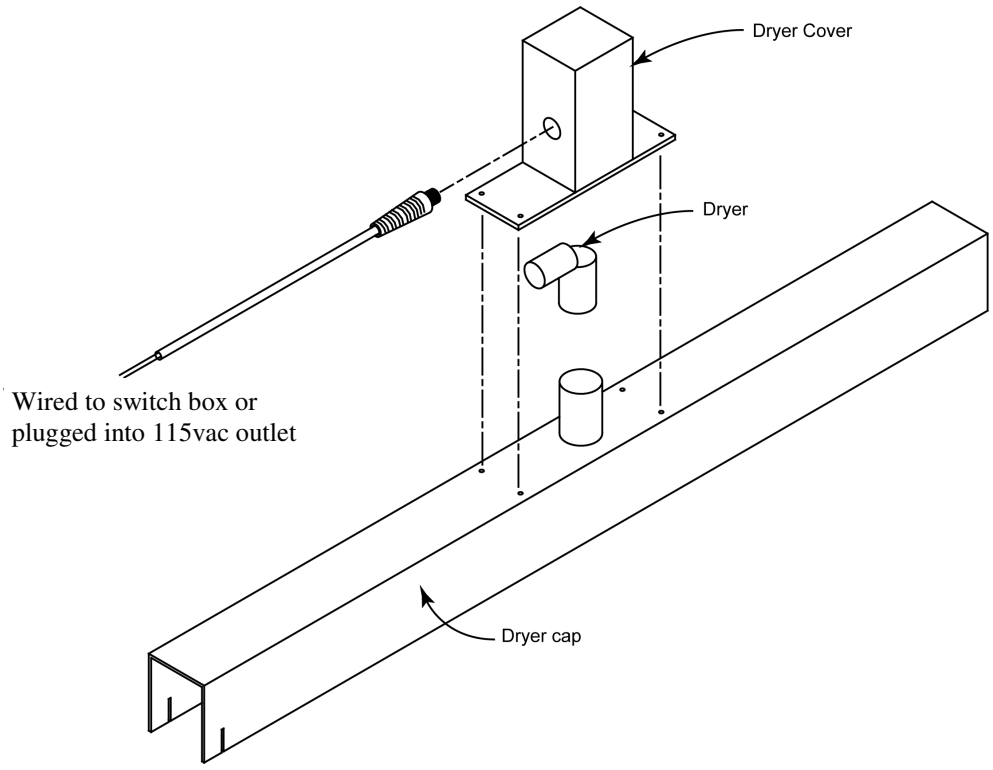
BALL DRYER OPERATION

BALL DRYING SYSTEM

Operation of the ball drying system requires one dryer mounted in the baseball hopper and one dryer mounted in the softball hopper. It also requires a ball dryer assembly mounted on each machine trough**. For customer safety, ABC does not recommend operating the fast or very fast baseball or softball machines during wet conditions.**

OPERATING YOUR BALL DRYING SYSTEM

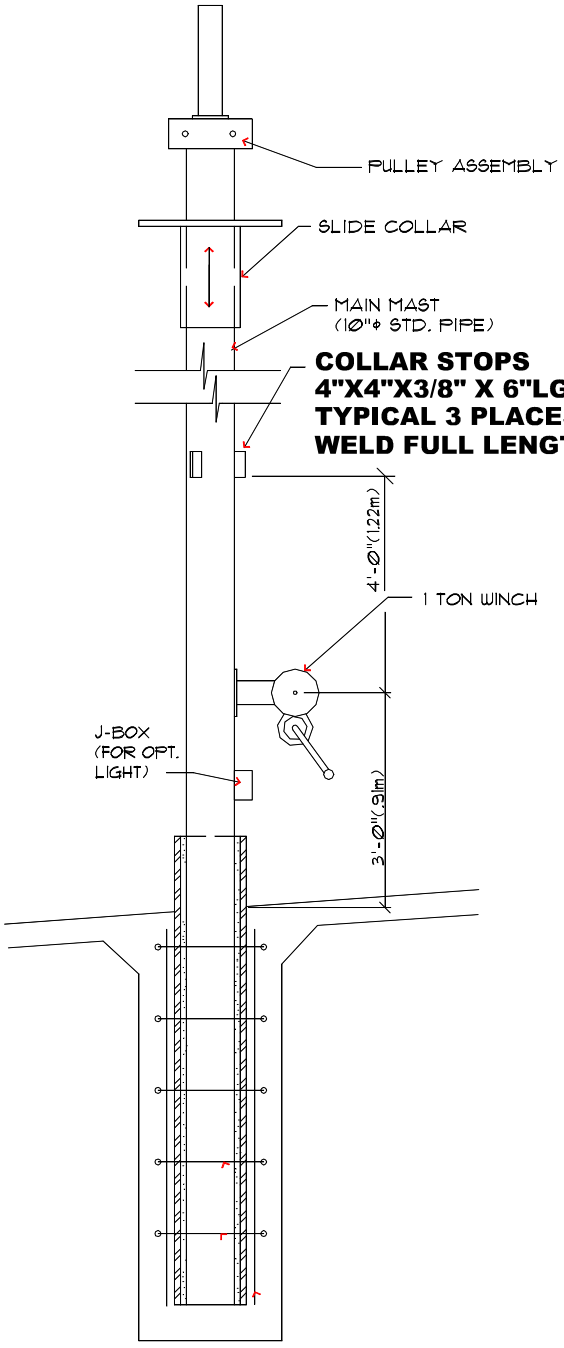
The ball drying system should be used any time you attempt to operate during wet conditions. **For effective drying of balls, the operator must insure that the feed troughs remain full of balls at all times.** This will prevent a wet ball from rolling directly down to the pinch roller without spending the correct amount of time in the drying chamber. The ball dryers have a low and high setting. In most cases, the low setting will effectively dry the balls. The high heat setting should be used if you are experiencing very wet conditions or any time the balls are not being completely dried. Conditions can vary at each location, so the operator must determine which setting will be required. If your dryers are not on an **automatic on/off switching system** and are running constantly with no games being played within 5 to 10 minutes, it is recommended that a manual game be activated so that the heated balls in the chamber are completely replaced by unheated balls. This will improve the accuracy of pitches on the next game played. Overly heated balls will become soft and affect the pitch. If you have any questions regarding the use of the ball drying system, please contact ABC's Customer Service Department at 1-800-578-2243.



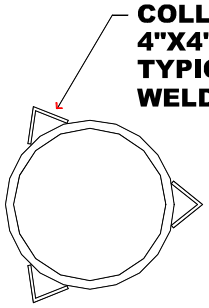
CENTER POLE WINCH & COLLAR

Pages 78 thru 101

IMPORTANT



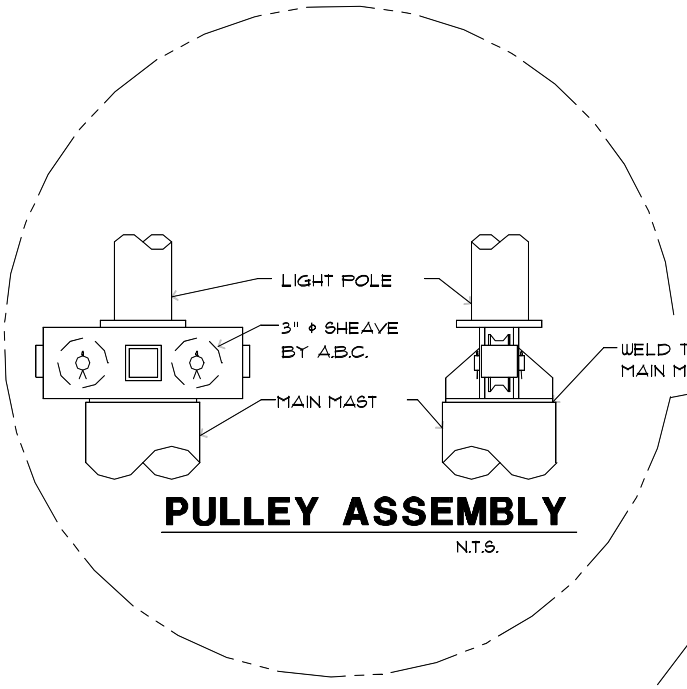
NOTE:
ABC WILL PROVIDE "COLLAR STOPS" (4"X4"X3/8" - 6" LONG) AT NO CHARGE. CALL ABC FOR ORDERING INFORMATION.



TOP VIEW

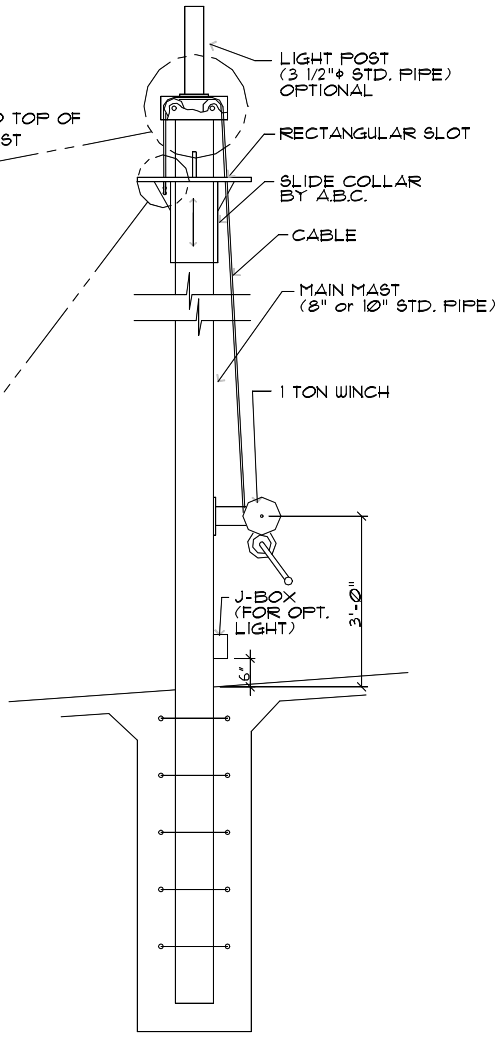
COLLAR STOPS/MAIN MAST DETAIL

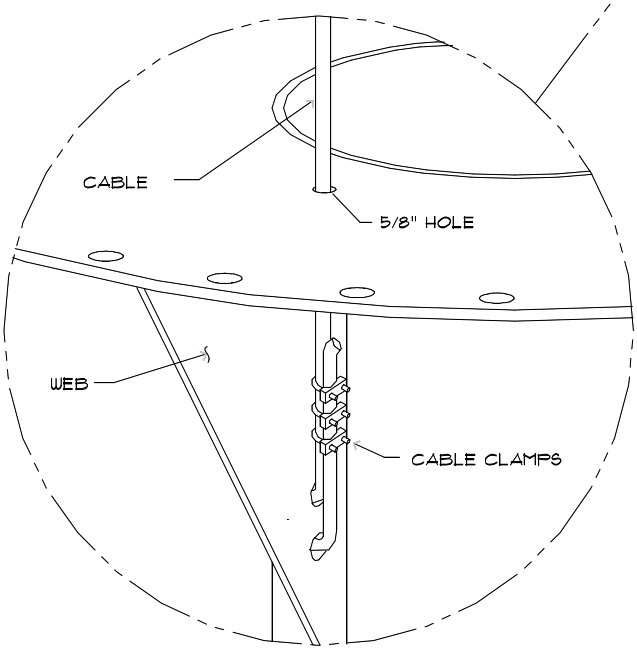
MAIN MAST MUST BE RIGGED PRIOR TO ERECTION. BE SURE TO INSTALL COLLAR, WINCH ASSEMBLY AND PULLEY ASSEMBLY. SEE NOTES BELOW FOR ATTACHMENT OF CABLE.



PULLEY ASSEMBLY

N.T.S.





NOTE:

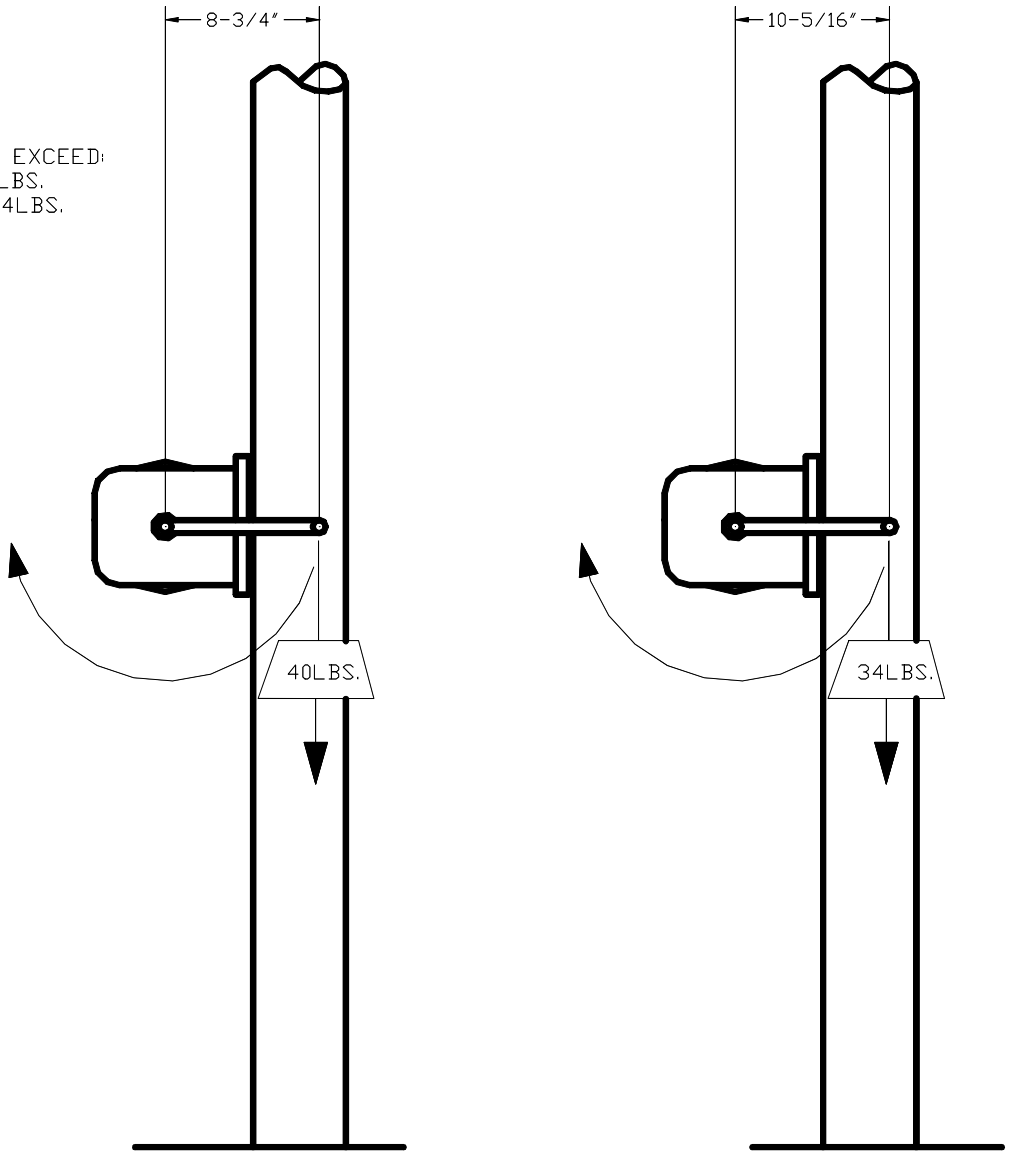
ALIGN WINCH WITH PULLEY SO CABLE GOES STRAIGHT UP MAINMAST AND THRU PULLEY ASSEMBLY.

ROUTE CABLE FROM WINCH ASSEMBLY TO MAINMAST COLLAR. FEED CABLE UP THRU THE RECTANGULAR SLOT ON THE COLLAR, THRU THE PULLEY, DOWN THRU THE 5/8" HOLE, THRU THE TWO HOLES IN THE TRIANGULAR GUSSET, AND CLAMP AS SHOWN IN DRAWING.

CABLE and WINCH DETAIL

IMPORTANT

MAX FORCE ON HANDLE NOT TO EXCEED:
HANDLE LENGTH (8-3/4") = 40LBS.
HANDLE LENGTH (10-5/16") = 34LBS.



CAUTION:
IF YOU HAVE ANY PROBLEMS DETERMINING
MAXIMUM FORCE CALL ABC FOR HELP.

THERN INCORPORATED

Owner's Manual

For The
Model M411PB
Spur Gear Hand Winch

Please record the following:

Date Purchased:

Model No.:

Code No.:

This information is required when calling the factory for service.

Two-Year Limited Warranty

Thern, Inc. warrants its products against defects in material or workmanship for two years from the date of purchase by the original using buyer, or if this date cannot be established, the date the product was sold by Thern, Inc. to the dealer. To make a claim under this warranty, contact the factory for an RGA number. The product must be returned, prepaid, directly to Thern, Inc., 5712 Industrial Park Road, Winona, Minnesota 55987. The following information must accompany the product: the RGA number, the date of purchase, the description of the claimed defect, and a complete explanation of the circumstances involved. If the product is found to be defective, it will be repaired or replaced free of charge, and Thern, Inc. will reimburse the shipping cost within the contiguous USA.

This warranty does not cover any damage due to accident, misuse, abuse, or negligence. Any alteration, repair or modification of the product outside the Thern, Inc. factory shall void this warranty. This warranty does not cover any costs for removal of our product, downtime, or any other incidental or consequential costs or damages resulting from the claimed defects. This warranty does not cover brake discs, as these are wear components and their life is subject to use conditions which vary between applications.

FACTORY AUTHORIZED REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY TO THE CONSUMER. THERN, INC. SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ON THIS PRODUCT. EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ON THIS PRODUCT IS LIMITED IN DURATION TO THE DURATION OF THIS WARRANTY.

Some states do not allow the exclusion or limitation of incidental or consequential damages, or allow limitations on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Note: Thern, Inc. reserves the right to change the design or discontinue the production of any product without prior notice.

About This Manual

The Occupational Safety and Health Act of 1970 states that it is the employer's responsibility to provide a workplace free of hazard. To this end, all equipment should be installed, operated, and maintained in compliance with applicable trade, industrial, federal, state, and local regulations. It is the equipment owner's responsibility to obtain copies of these regulations and to determine the suitability of the equipment to its intended use.

This Owner's Manual, and warning labels attached to the equipment, are to serve as guidelines for hazard-free installation, operation, and maintenance. They should not be understood to prepare you for every possible situation.

The information contained in this manual is applicable only to the Thern Model M4411PB Spur Gear Hand Winches. Do not use this manual as a source of information for any other equipment.

The following symbols are used for emphasis throughout this manual:

⚠WARNING

Failure to follow 'WARNING!' instructions may result in equipment damage, property damage, and/or serious personal injury.

⚠CAUTION

Failure to follow 'CAUTION!' instructions may result in equipment damage, property damage, and/or minor personal injury.

Important!

Failure to follow 'important!' instructions may result in poor performance of the equipment.

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Suggestions for Safe Operation

A5359B-0799

⚠WARNING

DO the following:

Read and comply with the guidelines set forth in this Owner's Manual. Keep this manual, and all labels attached to the winch, readable and with the equipment at all times. Contact Thern, Inc. for replacements.

Check lubrication before use.

Install the wire rope securely to the winch drum.

Keep at least 4 wraps of wire rope wound on the drum at all times, to serve as anchor wraps. Failure to do so could cause the load to fall.

Keep hands away from the drum, gears, wire rope, and other moving parts of the equipment.

DO NOT do the following:

Do not lift people, or things over people. Do not walk or work under a load or in the line of force of any load.

Do not exceed the load rating of the winch or any other component in the system.

Do not use more than one winch to move a load that exceeds the load rating of a single winch. A shift in load weight could overload the equipment.

Do not use damaged or malfunctioning equipment. To do so could result in failure of the equipment.

Do not modify the equipment in any way. To do so could cause equipment failure.

Do not wrap the wire rope around the load. This damages the wire rope and could cause the load to fall. Use a sling or other approved lifting device.

Do not operate the winch with guards removed or improperly installed.

Do not divert your attention from the operation. Stay alert to the possibility of accidents, and try to prevent them from happening.

Do not jerk or swing the load. Avoid shock loads by starting and stopping the load smoothly. Shock loads overload the equipment and may cause damage.

Do not lift loads or pull loads on an incline unless the winch is equipped with a brake.

Do not leave a suspended load unattended. Place the load on the ground if it must be left unattended.

1.1 Installing the Winch

Important!

- Inspect the winch immediately following installation according to the Instructions for Periodic Inspection. This will give you a record of the condition of the winch with which to compare future inspections.
- A qualified professional should inspect or design the foundation to insure that it will provide adequate support.
- Locate the winch so it will be visible during the entire operation.

⚠WARNING

Do not install the winch in an area defined as hazardous by the National Electric Code, unless installation in such an area has been thoroughly approved.

Do not install the winch near corrosive chemicals, flammable materials, explosives, or other elements that may damage the winch or injure the operator. Adequately protect the winch and the operator from such elements.

Position the winch so the operator can stand clear of the load, and out of the path of a broken wire rope that could snap back and cause injury.

Attach the winch to a rigid and level foundation that will support the winch and its load under all load conditions, including shock loading.

1.1.1 CONSULT APPLICABLE CODES AND REGULATIONS for specific rules on installing the equipment.

1.1.2 LOCATE THE WINCH in an area clear of traffic and obstacles that could interfere with operation. Make sure the winch is accessible for maintenance and operation.

1.1.3 MAINTAIN A FLEET ANGLE between 1/2 and 1-1/2 degrees. The proper fleet angle minimizes wire rope damage by helping the wire rope wind uniformly onto the drum. See figure 1.

1.1.4 FASTEN THE WINCH securely to the foundation.

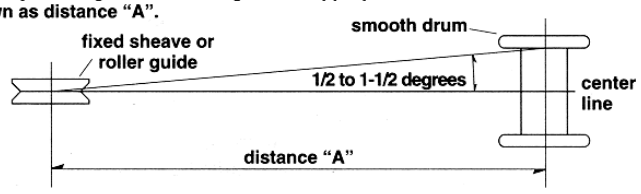
CONTACT A QUALIFIED PROFESSIONAL FOR MOUNTING INSTRUCTIONS TO COMPLY WITH LOCAL CODES.

Important!

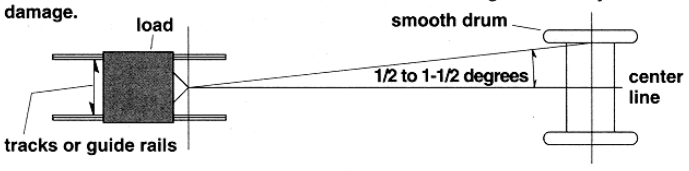
- Use a sheave or roller guide to direct the wire rope to the drum whenever possible.
- Install sheaves, tracks and other equipment so they will remain fixed under all load conditions. Follow the recommendations of the equipment manufacturer.
- Use sheaves of proper diameter to minimize wear on the wire rope. Follow the recommendations of the sheave manufacturer.

Figure 1 – Maintaining the Fleet Angle

- **When wire rope travels over a sheave or through a roller guide – maintain fleet angle by locating the sheave or guide an appropriate distance from the drum, shown as distance "A".**



- **When wire rope travels directly to the load – maintain fleet angle by controlling side-to-side movement of the load with tracks or guide rails. Allowing the load to move too far to one side causes stress on the drum flange which may cause damage.**



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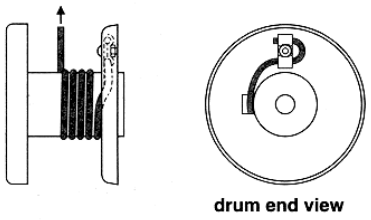
1.2 Installing the Wire Rope

Important!

- Use wire rope and other rigging equipment rated for the size of the largest load you will be moving.
- Do not drag the wire rope through dirt or debris that could cause damage, or poor operation.
- Always wear protective clothing when handling wire rope.

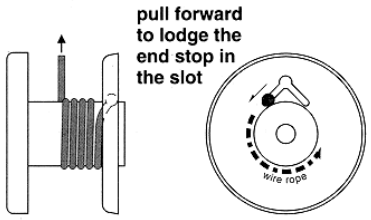
Figure 2 – Flange Clip Anchor



drum end view

typical installation shown
right lay – underwound

Figure 3 – Quick Disconnect Anchor



drum end view

typical installation shown
right lay – underwound

⚠WARNING

Install the wire rope so it is wound correctly as shown, or the winch will not work properly, and the load could fall.

Install the wire rope securely to the winch drum. A poorly secured wire rope could come loose from its anchor and allow the load to fall.

1.2.1 PURCHASE THE PROPER WIRE ROPE for your application. Keep the following in mind when selecting a wire rope. Contact a reputable wire rope supplier for help.

a BREAKING STRENGTH of new wire rope should be at least 3 times greater than the largest load placed on the winch. If loads are lifted or pulled on an incline, the breaking strength must be at least 5 times greater than the largest load. These are minimum values and will vary with the type of load and how you are moving it.

b WIRE ROPE LAY must agree with the winding direction of the drum to help insure proper winding.

c WE RECOMMEND 7 x 19 galvanized aircraft cable for diameters up to 5/16 inch.

1.2.2 INSTALL THE HANDLE by loosening the set screw and assembling the handle and socket to the hex drive. Secure in place by tightening the set screw.

1.2.3 ANCHOR THE WIRE ROPE to the drum using either the flange clip or quick disconnect anchor.

a FLANGE CLIP ANCHOR. See figure 2.

- PASS THE END OF THE WIRE ROPE through the hole in the flange.
- INSERT THE CARRIAGE BOLT, loop the wire rope around the bolt, and install the clip so the wire rope is held by the curves of the clip.
- INSTALL THE JAM NUT and tighten it until the wire rope is flattened against the drum flange.

b QUICK DISCONNECT ANCHOR. See figure 3.

- PUSH THE END STOP through the large center hole in the drum flange.
- PULL THE WIRE ROPE forward to lodge the end stop in the slot.

1.2.4 TURN THE HANDLE CLOCKWISE to wind wire rope onto the drum. If wire rope unwinds from the drum when the handle is rotated clockwise, the wire rope is installed incorrectly. **Install the wire rope correctly before continuing.**

1.2.5 WIND FOUR FULL WRAPS of wire rope onto the drum by operating the winch while holding the wire rope taught. **These wraps serve as anchor wraps and must remain on the drum at all times.**

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2.1 General Theory of Operation

Important!

- Limit nonuniform winding by keeping tension on the wire rope and by maintaining the proper fleet angle.
- It is your responsibility to detect and account for different factors affecting the condition and performance of the equipment.

2.1.1 THE PULL REQUIRED to move the load must not exceed the load rating of the winch. Consider the total force required to move the load, not the weight of the load.

2.1.2 THIS EQUIPMENT CAN develop forces that will exceed the load rating. It is the responsibility of the equipment user to limit the size of the load. Inspect the equipment regularly for damage according to the instructions contained in this manual.

2.1.3 USE A DISC BRAKE on all hand winches used to lift loads or pull loads on an incline.

2.1.4 PERFORMANCE RATINGS of the equipment are affected by the amount of wire rope wound on the drum, the way in which it is wound, and the way the winch is used.

a DRUM CAPACITY depends on how tightly and evenly the wire rope is wound on the drum. Actual drum capacities are usually 25-30% less than values shown in performance tables, due to loose winding and overlapping.

b FORCE REQUIRED TO LIFT the load increases with each additional layer of wire rope wound onto the drum. The value shown in performance tables is based on an empty drum.

c LOAD RATING represents the maximum pull that can be placed on new equipment. Load ratings are assigned values for specific amounts of load travel or wire rope accumulation. The load rating decreases as layers of wire rope accumulate on the drum.

2.1.5 DUTY RATINGS refer to the type of use the equipment is subject to. Consider the following when determining duty rating.

a ENVIRONMENT: harsh environments include hot, cold, dirty, wet, corrosive, or explosive surroundings. **Protect the equipment from harsh environments when possible.**

b MAINTENANCE: poor maintenance, meaning poor cleaning, lubrication, or inspection, leads to poor operation and possible damage of the equipment. **Minimize poor maintenance by carefully following the instructions contained in this manual.**

c LOADING: severe loading includes shock loading and moving loads that exceed the load rating of the equipment. **Avoid shock loads, and do not exceed the load rating of the equipment.**

d FREQUENCY OF OPERATION: frequent or lengthy operations increase wear and shorten the life span of gears, bearings, and other components. **Increase maintenance of the equipment if used in frequent operations.**

CONTACT THE FACTORY FOR MORE INFORMATION.

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2.2 Suggestions for Safe Operation

⚠WARNING

DO the following:

Keep at least 4 wraps of wire rope wound on the drum at all times, to serve as anchor wraps. With less than 4 wraps on the drum the wire rope could come loose, causing the load to fall.

Keep hands away from the drum, gears, wire rope, and other moving parts of the equipment.

Keep all people, including operators and yourself, away from the winch. Keep out of the path of the load, and out of the path of a broken wire rope that might snap back and cause injury.

DO NOT do the following:

Do not lift people, or things over people. Do not walk or work under a load or in the line of force of any load.

Do not exceed the load rating of the winch or any other component in the system. To do so could result in failure of the equipment.

Do not use more than one winch to move a load that exceeds the load rating of a single winch. A shift in load weight could overload the equipment.

Do not use damaged or malfunctioning equipment. To do so could result in failure of the equipment.

Do not modify the equipment in any way. To do so could cause equipment failure.

Do not operate the winch with guards removed or improperly installed.

Do not divert your attention from the operation. Stay alert to the possibility of accidents, and try to prevent them from happening.

Do not jerk or swing the load. Avoid shock loads by starting and stopping the load smoothly. Shock loads overload the equipment and may cause damage.

Do not lift loads or pull loads on an incline unless the winch is equipped with a brake.

Do not leave a suspended load unattended. Place the load on the ground before leaving it unattended.

2.3 Breaking-In the Winch

2.3.1 BREAK-IN OCCURS during the first 10 hours of normal operation. During break-in, mating surfaces become polished, and clearances increase. This is desired for efficient operation of bearings and gears.

2.3.2 INSPECT THE WINCH following break-in according to the Instructions for Periodic Inspection.

2.4 Preparing for Operation

Important!

- When determining whether the load will exceed the load rating, consider the total force required to move the load.

2.4.1 CONSIDER THE OPERATION. Do not begin until you are sure you can perform the entire operation without hazard.

2.4.2 INSPECT ALL COMPONENTS of the system.

a INSPECT THE WINCH and other equipment according to the Instructions for Frequent Inspection.

b OPERATORS must be in good health, alert, thoroughly trained in operating the equipment, and properly clothed (hard hat, safety shoes and safety glasses, no loose clothing).

c THE LOAD must be clear of other objects and free to move. Make sure the load will not tip, spin, roll away, or in any way move uncontrollably.

2.4.3 KNOW YOUR LOAD and make sure you do not exceed the load rating of the winch or any other equipment in the system.

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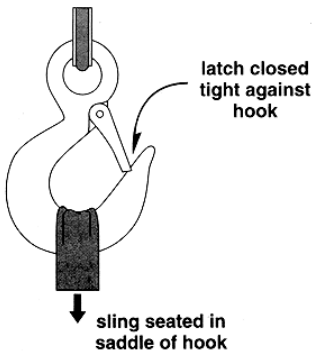
2.5 Attaching the Load

Figure 4 – Attaching Load



⚠WARNING

Do not wrap the wire rope around the load. This damages the wire rope and could cause the load to fall. Use a sling or other approved lifting device.

2.5.1 CLEAR OBJECTS from the path of the load so you can move it freely and observe it at all times during the operation.

2.5.2 ATTACH THE LOAD using a nylon sling, or other approved lifting device. Follow the recommendations of the sling manufacturer.

a SEAT THE SLING in the saddle of the hook with the hook latch completely closed. See figure 4.

b CENTER THE LOAD on the hook so it will remain balanced and not tip or rotate to one side.

2.6 Moving the Load

Important!

- Obey a stop signal from anyone.
- Maintain tension on the wire rope to keep it tightly and evenly wound on the drum.
- If the winch and load are not visible during the entire operation, get help from another person.
- Appoint a supervisor if more than one person is involved in the operation. This will reduce confusion and increase safety.
- When lifting a load, use a tag line to keep the load from swinging or twisting, while keeping yourself away from the load.
- Remove the winch handle when the winch is not in use, to help avoid unauthorized use.

2.6.1 MOVE THE LOAD slowly and smoothly, only a small distance at first. Make sure the load is balanced and securely attached before continuing.

2.6.2 TURN THE HANDLE CLOCKWISE to wind wire rope onto the drum. If wire rope unwinds from the drum when the handle is rotated clockwise, the wire rope is installed incorrectly. **Install the wire rope correctly before continuing.**

2.6.3 OBSERVE THE WIRE ROPE as it winds onto the drum. If it becomes loose, uneven, or overlapped, stop the operation and rewind the wire rope before continuing. **Continued operation with overlapped or uneven wire rope can damage the wire rope and shorten its life.**

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3.1 Cleaning the Winch

Important!

Increase the frequency of maintenance procedures if the winch is:

- Operated for long periods.
- Used to pull heavy loads.
- Operated in wet, dirty, hot, or cold surroundings.

Clean the winch to remove dirt and help prevent rust and corrosion.

3.1.1 CLEAN THE WINCH every six months or whenever it is dirty.

a WIPE ALL EQUIPMENT with an oily rag to remove dirt and grease.

b LEAVE A LIGHT FILM of oil on all surfaces to protect them against rust and corrosion.

c WIPE OFF excessive amounts of oil to avoid the accumulation of dirt.

3.1.2 REMOVE ALL UNNECESSARY OBJECTS from the area surrounding the winch.

3.2 Lubricating the Winch

Important!

- Make sure lubricant has a temperature rating appropriate for the ambient temperatures of the operation.

⚠CAUTION

Do not over lubricate the brake bushings. Over lubricating may cause oil to leak onto the friction discs, which may damage the friction discs or result in poor operation of the disc brake.

Lubricate the spur gears before each operation, and periodically during operation. Failure to lubricate the gears will cause damage or deformation of gear teeth.

Lubricate the winch properly to help protect it from wear and rust. Read the following instructions carefully.

3.2.1 CONSULT MANUFACTURER'S RECOMMENDATIONS for specific information on lubricating the wire rope and other equipment.

3.2.2 LUBRICATE WINCH BEARINGS AND SHAFTS at least every 6 months.

a APPLY 2 TO 3 DROPS of SAE 30 non-detergent oil to bearings and shafts at all friction points.

b ROTATE THE DRUM several times to allow the oil to penetrate, and wipe off excess oil to avoid accumulation of dirt.

3.2.3 LUBRICATE WINCH GEARS before every operation and at least every 10 hours during operation.

a APPLY A LIGHT FILM of open gear lubricant to the gear teeth on all gears.

b USE SPRAYON 201 or equivalent open gear lube. For dirty conditions use a dry lubricant such as dry graphite or Moly.

3.2.4 LUBRICATE THE DISC BRAKE at least every 6 months. Place 1 or 2 drops of SAE 30 non-detergent oil into the hole in the brake housing marked "oil", and turn the brake several times to allow the oil to penetrate.

3.2.5 LUBRICATE THE WIRE ROPE by following the wire rope manufacturer's recommendations.

3.3 Inspecting the Equipment

Important!

- Start an inspection program as soon as you put the winch into use.
- Appoint a qualified person to be responsible for regularly inspecting the equipment.
- Keep written records of inspection. This allows comparison with comments from previous inspections so you can see changes in condition or performance.

Perform frequent inspections:

- Before each operation.
- Every 3 hours during operation.
- Whenever you notice signs of damage or poor operation.

⚠WARNING

Do not use damaged or malfunctioning equipment. Place an "OUT OF ORDER" sign on the winch. Do not use the winch until the sign is removed by a qualified maintenance person who has completely corrected the problem.

Inspect the winch to detect signs of damage or poor operation before they become hazardous.

3.3.1 CONSULT APPLICABLE CODES AND REGULATIONS for specific rules on inspecting the winch and other equipment.

3.3.2 CONSULT MANUFACTURER'S RECOMMENDATIONS for information on inspecting the wire rope and other equipment.

3.3.3 **Instructions for Frequent Inspection**

a VISUALLY INSPECT the entire winch and all other equipment involved in the operation.

- Check all equipment for cracks, dents, bending, rust, wear, corrosion and other damage.
- Make sure the wire rope is installed correctly and anchored securely to the drum.
- Make sure the winch and brake are properly lubricated.
- Make sure the set screw holding the handle in place is tight.
- Make sure mounting fasteners are tightened securely.
- Make sure the foundation is in good condition, and capable of supporting the winch and its load under all load conditions.

b TEST WINCH PERFORMANCE by moving a test load of 100 pounds.

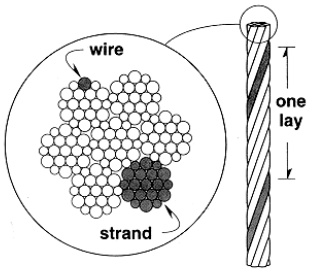
- Listen for unusual noises, and look for signs of damage as you operate the winch.
- Make sure the wire rope winds evenly and tightly onto the drum. If it is loose or uneven, rewind it before continuing.
- Make sure the handle rotates freely in both directions.
- Make sure the disc brake ratchet pawl clicks firmly as the brake handle is turned clockwise.
- Check the brake. Raise the load, then lower it and stop it a few feet off the ground. If the load continues to coast or creep, the friction discs may be worn and in need of replacement.

Completely correct all problems before continuing. Use the Troubleshooting Chart to help determine the cause of certain problems. See table 2.

Perform periodic inspections:

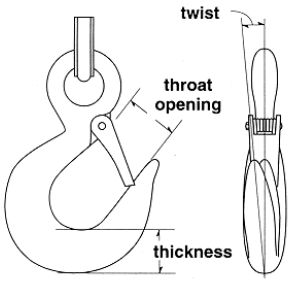
- Every 6 months.
- Whenever you return the winch to service from storage.
- Whenever you notice damage or poor operation in a frequent inspection.
- Whenever you have, or think you may have, overloaded or shock loaded the winch.

Figure 5 – Broken Wires



Wire rope assembly must be replaced if more than 6 wires are broken in one lay, or if more than 3 wires are broken in one strand in one lay.

Figure 6 – Load Hook Inspection



The wire rope assembly must be replaced if the throat opening is 15% wider than nominal, if the thickness is 10% less than nominal, or if the hook is twisted 10° or more.

3.3.4 **Instructions for Periodic Inspection**

a VISUALLY INSPECT the winch and all other equipment.

- Check the finish for wear, flaking, or other damage.
- Check all equipment for cracks, dents, bending, rust, wear, corrosion and other damage. If the winch was overloaded, or if you notice cracks and other signs of overloading, check for damage using magnetic or chemical crack detecting procedures.
- Check all fasteners for stripped threads, wear, bending, and other damage.
- Check the foundation for cracks, corrosion, and other damage.
- Make sure the winch and brake are properly lubricated.
- Make sure all labels and plates are readable, firmly attached, free of damage and clean. Replacements are available from the factory.

b REMOVE THE WIRE ROPE entirely from the drum.

- Always wear protective clothing when handling wire rope.
- Check the entire length of wire rope for bent wires, crushed areas, broken or cut wires, corrosion, and other damage. Carefully inspect areas that pass over sheaves or through roller guides.
- Note the location and concentration of broken wires. Replace wire rope if more than 6 wires are broken in one lay, or more than 3 wires are broken in one strand in one lay. See figure 5.
- Make sure the load hook or other device is securely attached to the wire rope, and the wire rope where it is attached is not frayed, corroded, broken, or otherwise damaged.
- Measure the throat opening, thickness, and twist of the hook. Replace the hook if it shows signs of damage. See figure 6.
- Make sure hook latch opens without binding and closes when released.
- Check the anchor holes in the drum flange for signs of wear or distortion.

c PLACE 100 POUNDS of tension on the wire rope.

- Measure the diameter of the wire rope, especially in areas where wear is noticeable. Replace the wire rope if the diameter measures below the minimum diameter at any point. See figure 7.

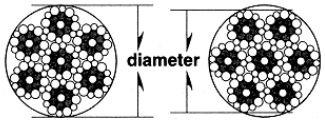
d REMOVE THE WINCH from the foundation.

- Check fasteners for stripped threads, wear, bends, and other damage.
- Check the frame for bending, distortion, cracks and other damage. A bent frame is caused by overloading, and is a sign that your application may require a winch with a larger load rating.

e MOVE THE DRUM with your hands.

- Check for excessive movement indicating worn or loose gears, bearings, or shafts.
- Disassemble the winch and brake if necessary. Inspect gears, bearings, spring pins, and shafts for wear, corrosion, distortion, and other damage.

Figure 7 – Rope Diameter



correct incorrect

The wire rope assembly must be replaced if the diameter measures less than the minimum diameter at any point.

wire rope diameter	minimum diameter
1/8 in	7/64 in (.1094 in)
3/16 in	11/64 in (.1719 in)
1/4 in	15/64 in (.2344 in)
5/16 in	19/64 in (.2969 in)

f FASTEN THE WINCH securely to the foundation.

g INSTALL THE WIRE ROPE.

h TEST WINCH PERFORMANCE by operating the winch with a test load equal to the load rating.

- Listen for unusual noises, and look for signs of damage as you operate the winch.
- Make sure the wire rope winds evenly and tightly onto the drum. If it is loose or uneven, rewind it before continuing.
- Observe the rotating drum, look for signs of loose or misaligned bearings.
- Make sure the handle rotates freely in both directions.
- Make sure the disc brake ratchet pawl clicks firmly as the brake handle is turned clockwise.
- Check the brake. Raise the load, then lower it and stop it a few feet off the ground. If the load continues to coast or creep, the friction discs may be worn and in need of replacement.

Completely correct all problems before continuing. Use the troubleshooting chart to help determine the cause of certain problems. See table 2.

Table 1 – Inspection Checklist

checked boxes indicate damage or problem in need of repair

	damages	problems
general	☐ finish weathered, flaking, otherwise damaged ☐ parts cracked, bent, rusted, worn, otherwise damaged	☐ winch jerks or hesitates during operation ☐ unusual noises, other signs of malfunction
fasteners	☐ stripped threads, bent, worn, otherwise damaged	☐ loose, not tightened to proper torque
gears	☐ excessively worn, cracked, corroded, otherwise damaged	☐ loose or improperly lubricated
brake assembly	☐ brake corroded, cracked, worn, otherwise damaged	☐ brake does not operate properly
drum	☐ anchor hole worn, distorted, otherwise damaged	☐ excessive movement or backlash
wire rope	☐ bent, crushed, otherwise damaged ☐ broken wires, see figure 5 replace if more than 6 wires in one lay, or 3 wires in one strand in one lay, are broken ☐ diameter reduced, see figure 7 replace if diameter is excessively worn	☐ wire rope loosely or unevenly wound number per strand = number per lay = diameter =
end connections	☐ corroded, rusted, worn, otherwise damaged	☐ not securely attached
hook or other device	☐ twisted, bent, worn, otherwise damaged, see figure 6 replace if twist is 10 degrees or more replace if throat width is 15% larger than nominal replace if thickness is 10% less than nominal	☐ hook latch fails to close when released twist = throat width = thickness =
labels and plates	☐ dirty, illegible, otherwise damaged	☐ loosely attached or missing

comments _____

_____

_____

_____

authorized signature _____ **date** _____

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3.4 Repairing the Winch

Important!

- It is your responsibility to determine when to replace parts. When considering whether to continue using a part or to replace it, remember that replacing it is the best way to avoid further equipment damage.
- Replace all spring pins and retaining rings when you disassemble the winch or brake for repair or replacement.
- Appoint a qualified person to be responsible for all repairs to the equipment.

3.4.1 GET FACTORY AUTHORIZATION for all repairs. Unauthorized repairs will void the warranty, and may lead to damage or failure of the winch.

3.4.2 REPLACE DAMAGED OR POORLY OPERATING PARTS with Thern repair parts.

3.4.3 REFINISH AREAS where the paint is worn or flaking. A good finish helps to protect against corrosion and weather damage.

a REMOVE THE FINISH from damaged areas, down to the bare metal.

b CLEAN THE AREA thoroughly.

c REPAINT with a high quality primer and finishing coat.

3.4.4 TO ORDER REPAIR PARTS, contact your local dealer. Include the following information when ordering:

- model number
- serial number (or code number)
- part number
- date purchased, and from whom
- description of what happened, or what is wrong
- your name and return address

Owner's Manual for Thern Model M441PB Spur Gear Hand Winch

TABLE 2— TROUBLESHOOTING CHART

Problem	Cause	Correction
Handle turns, drum doesn't turn	●loose or broken spring pins	..inspect winch and brake, repair as necessary
	●loose, stripped or broken gears	.inspect gears and repair as necessary
Handle turns hard or not at all	●ratchet on winch engaged	.disengage winch ratchet
	●load too heavy	..lighten load
	●spring pins loose or broken on winch or brake	..inspect winch and brake, repair as necessary
	●disc brake damaged or locked	..inspect brake, repair as necessary
	●gears or bearings broken or locked	.inspect and repair as necessary
Brake does not operate properly	●friction discs worn or damaged	.inspect and replace as necessary
	●friction discs damaged from over lubrication	.inspect and replace as necessary
	●disc brake ratchet pawl damaged	.inspect and repair as necessary
Excessively worn gears or bearings (excessive backlash)	●load too heavy	..lighten load
	●poor lubrication of gears or bearings	.inspect and relubricate as necessary
Overheating	●operated too long without rest	..allow to cool
	●load too heavy	...lighten load
	●poor lubrication	.inspect and lubricate as necessary
	●bearing seized up	..inspect and replace as necessary
Unusual noises		
high pitched squeak	●poor lubrication	.inspect and relubricate as necessary
grinding noise	●contaminated lubrication	...clean and relubricate winch
	●dirt in brake or winch gears	...inspect and clean as necessary
	●broken gears or bearings	.inspect and replace as necessary
rattling noise	●loose bolts, set screws or other fasteners	.tighten all bolts and other fasteners
uneven clicking noise in brake	●broken gear tooth in brake	..inspect and repair as necessary
weak clicking noise in brake	●spring or ratchet pawl dirty or damaged	.inspect and clean or repair as necessary
	●worn brake ratchet pawl, gear, or spring	.inspect and replace as necessary
no clicking noise in brake	●ratchet incorrectly installed	...disassemble and install correctly
	●ratchet pawl damaged or worn excessively	.inspect and replace as necessary

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4.1 Transporting the Winch

Important!

- Keep a record of what you ship, and when you send it.

4.1.1 PACK THE WINCH using the original packaging materials, if possible.

4.1.2 SEAL THE WINCH in plastic with a desiccant to help protect it from rust, corrosion, and other damage.

4.1.3 INSPECT THE WINCH according to the Instructions for Periodic Inspection before installing it in a new location.

4.2 Storing the Winch

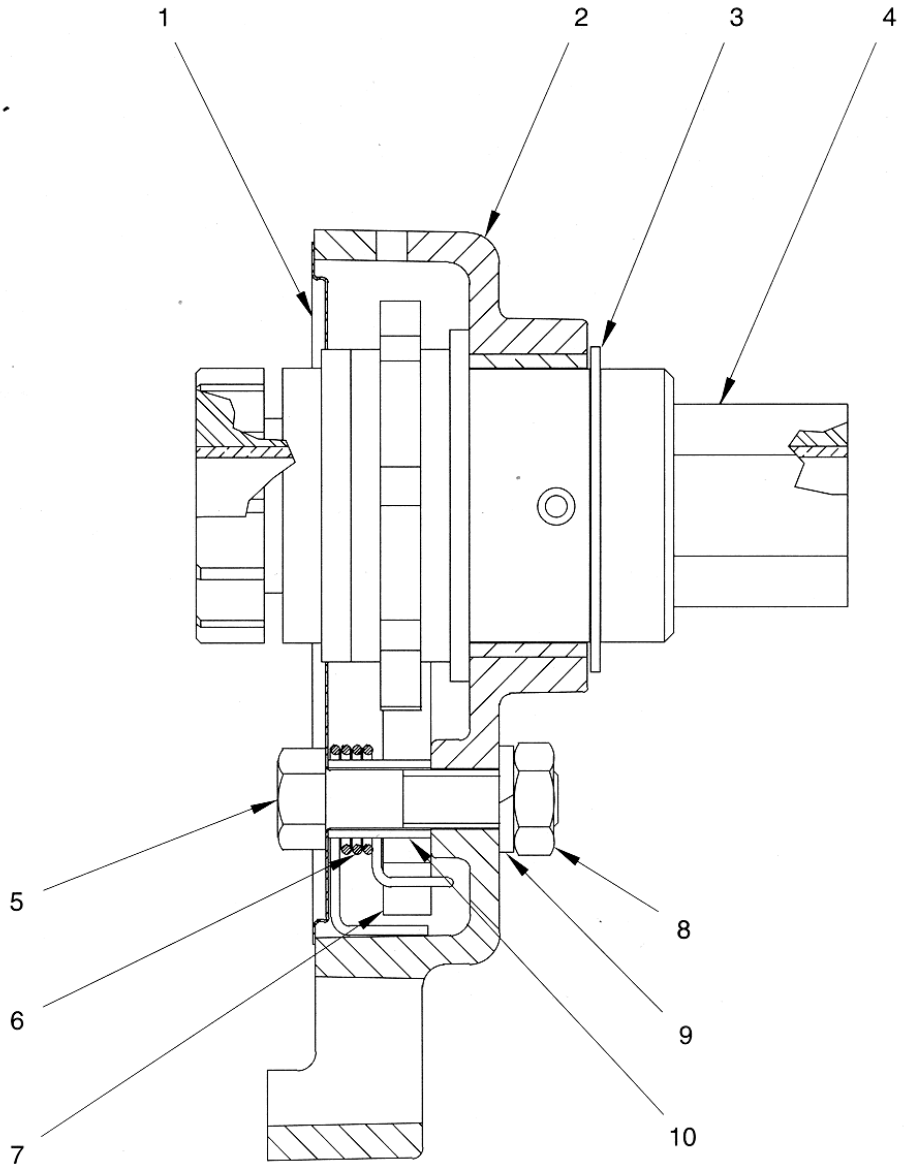
4.2.1 SEAL THE WINCH in plastic with a desiccant to help protect it from rust, corrosion, and other damage.

4.2.2 STORE THE WINCH in a cool clean place away from corrosive chemicals and moisture.

4.2.3 ROTATE THE DRUM periodically to keep bearing and gear surfaces from becoming lacquered.

4.2.4 INSPECT THE WINCH according to the Instructions for Periodic Inspection before installing it for operation.

Parts List for Disc Brake Assembly			
item	description	part number	qty.
1	Brake Cover	A1105	1
2	Bearing Housing Assembly	C2678	1
3	Retaining Ring 1.750 SST	A3883	1
4	Drive Assembly	SB3898	1
5	Capscrew Hexhd .375-16NC x 1.500 SST	A3884	1
6	Torsion Spring SST	A1842	1
7	Ratchet Pawl	A1103	1
8	Hex Jam Nut .375-16NC SST	A3330	1
9	Lock Washer HelSpr .375 x .683 x .094 SST	A3357	1
10	Spacer.391 x .500 x .675	A1104	1



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Model M4411PB Spur Gear Hand Winch			
item	**description**	**part number**	**qty.**
1	Drum Assembly	C1564	1
2	Drum Shaft	C1558	1
3	Drum Gear Guard	B1067	1
4	Countershaft Gear Guard	B1021	1
5	Countershaft Assembly	B2387	1
6	Left Frame Plate	C1034	1
7	Right Frame Plate	C1033	1
8	Radial Ball Bearing .750ID x 1.750OD x .60W	A1256	1
9	Retaining Ring .750 SST	A4408	1
10	Hex Jam Nut .750-16NF SST	A3886	2
11 [1]	Handle Socket	B2089	1
12 [1]	Handle Assembly	SB3874	1
13	Hex Nut .250-20NC SST	A3331	1
14	Capscrew Hxhd Nylk .250-20NC x 1.250 SST	A1870	2
15	Slotted Spring Pin .187 x .750 SST	A4282	1
16	Spacer .312 x .406 x 1.000 ZNPLIRDI	A2820	2
17	Carriage Bolt .250-20NC x .750 SST	A2846	1
18	Tie Down	A1013	1
19 [1]	Setscrew Sqhd Cuppt .312-18NC x .750 SST	A3885	1
20	Disc Brake Assembly	SC2516	1
21	Frame Rod	A1147	1
22	Hex Jam Nut .375-16NC SST	A3330	2
23	Shakeproof Lock Washer .375 x .692 x .035 SST	A3939	2
24	Machinery Bushing .625 x 14GA SST	A5059	1

[1] Items 11, 12, and 19 are not shown in parts drawing.

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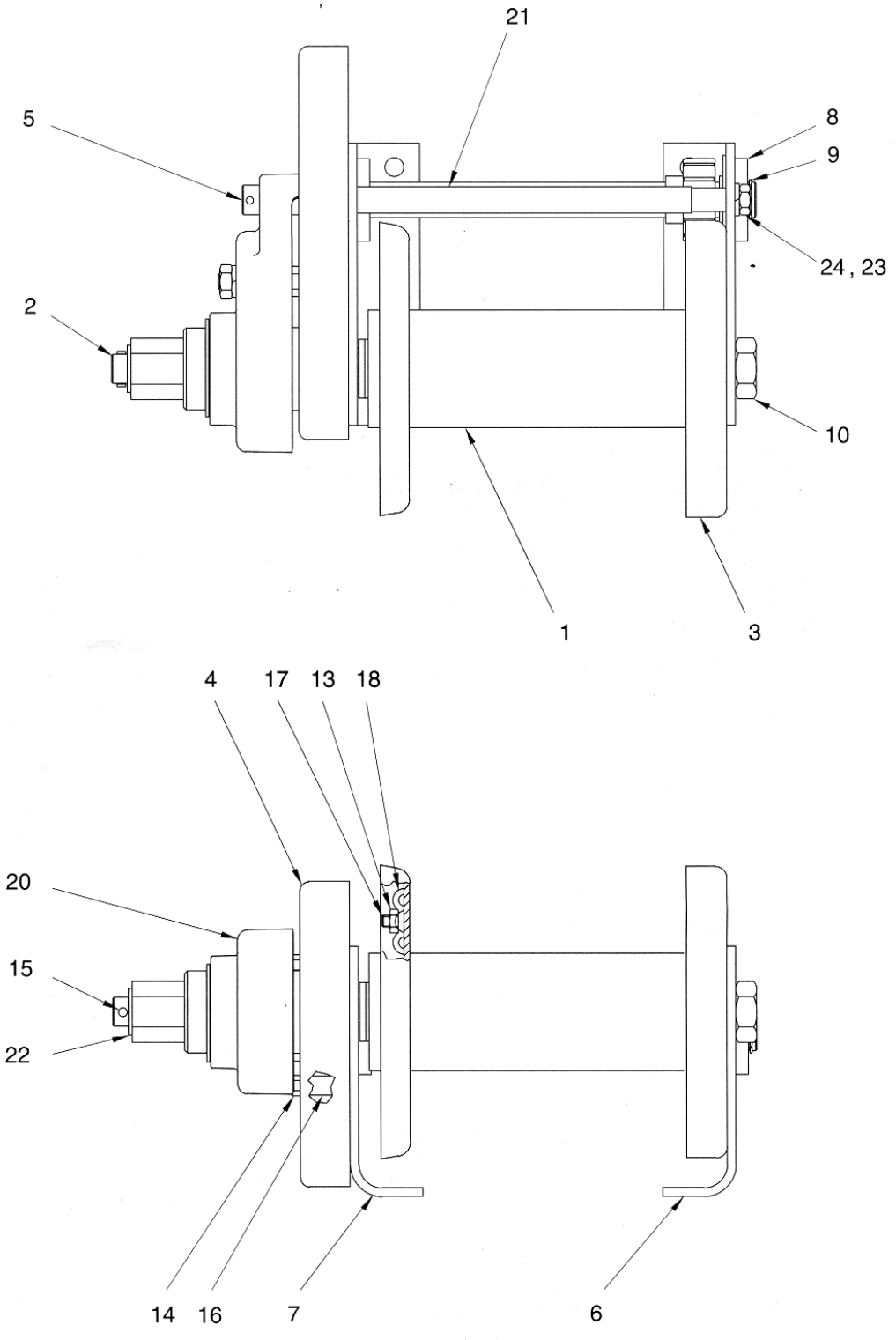

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